

HIGHLIGHTING RESEARCH
AND OUTREACH EFFORTS AT
THE UNIVERSITY OF KENTUCKY

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EQUINE SCIENCE REVIEW

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College of Agriculture,
Food and Environment

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Equine Science Review is a monthly College of Agriculture, Food and Environment newsletter that highlights important equine work happening at the University of Kentucky.



Photo courtesy Dr. Jimmy Henning.

JACQUAY NAMED MARS EQUESTRIAN™ SCHOLAR AT THE GLUCK EQUINE RESEARCH CENTER

Erica Jacquay, graduate student under Amanda Adams, PhD, MARS EQUESTRIAN™ Fellow and associate professor at the University of Kentucky Gluck Equine Research Center, was recently awarded support by MARS EQUESTRIAN for her research program.

“We are thrilled and very grateful to MARS EQUESTRIAN for their support of this research, which will help improve the health and well-being of the horse, a goal of both MARS EQUESTRIAN and the Gluck Center,” Adams said.

Jacquay earned her Bachelor of Science in animal and dairy science from Virginia Polytechnic Institute and State University and her Master of Science from Kansas State University in animal science.

Jacquay said she first became involved in equine research while interning at the MARE Center in Middleburg, Virginia. During her time in Kansas, she focused on equine reproduction, studying changes in the mare and foal fecal microbiome from birth through weaning, as well as the effect different weaning methods had on the fecal microbiome.

After completing her master’s degree, she moved to Pennsylvania for a year to breed, foal and train Connemara ponies in dressage. In 2018, she moved to Lexington, Kentucky, to work in the reproduction unit at Spy Coast Farm, where she also coordinated ongoing research projects with UK. Prior to beginning her doctorate at UK, Jacquay also worked at EDS, where she performed serology/PCR testing for equine diseases. She started in Adams’ lab in August 2020.

Jacquay’s research program objectives include conducting a nationwide survey on common



IMAGE COURTESY SABRINA JACOBS.

reasons for transporting horses and management practices associated with different types of travel, particularly with respect to road transportation of three hours or less. She aims to determine the impact of short-term transportation on stress and immune function in horses.

Through this study, she also plans to determine if there are differences in how transportation stress manifests in different classes of horses, including aged horses and horses with Pituitary pars intermedia dysfunction (PPID, also commonly known as equine Cushing’s disease), Equine Metabolic Syndrome (EMS) or insulin dysregulation (ID, a condition where horses have either increased levels of insulin in their blood or abnormal insulin responses to a meal).

The work will be undertaken in collaboration with Bridgett McIntosh, PhD, director of MARS EQUESTRIAN and Pat Harris, PhD VetMB DipECVCN MRCVS, EBVS® European specialist in veterinary and comparative

nutrition and member of European College of Veterinary and Comparative Nutrition, from Waltham Petcare Science Institute.

“This research is novel and important, given that horse transportation is an integral part of the industry, whether it be for competition, leisure, breeding or veterinary purposes,” Adams said.

Through this work, she hopes to develop non-invasive methods horse owners can implement to measure and monitor stress as well as key health parameters in horses during transportation.

“By being aware of travel stressors and taking steps to minimize their impact, we hope to help owners to help their horses arrive in good condition after short-term transportation,” Adams said.

ABOUT THE GLUCK 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. Gluck Center faculty conduct equine

research in seven targeted areas: genetics and genomics, immunology, infectious diseases, musculoskeletal science, parasitology, pharmacology, therapeutics and toxicology and reproductive health. The Gluck Equine Research Center, a UK Ag Equine Program, is part of the Department of Veterinary Science in the College of Agriculture, Food and Environment at the University of Kentucky.

ABOUT MARS EQUESTRIAN™

MARS EQUESTRIAN™ Sponsorship, funded by Mars, Incorporated is the link between our iconic brands and the equestrian community. For generations, Mars has celebrated a rich equestrian heritage, and through purposeful partnerships, MARS EQUESTRIAN is committed to the sport and building an enduring legacy. From world-class

competitions across all equestrian disciplines, to stewarding the power of horses on society and sustainability, the MARS EQUESTRIAN Brand is dedicated to our purpose to improve the lives of horses, pets, and the people who love them. For more information please visit www.marsequestrian.com and join us @marsequestrian.

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ABOUT THE WALTHAM PETCARE SCIENCE INSTITUTE

The Waltham Petcare Science Institute is Mars Petcare's pet research center. Our work focuses on the nutritional and behavioral needs of pets, as well as preventive health. We use this knowledge

to support development of innovative products and services, advancing science to deliver our Purpose: A BETTER WORLD FOR PETS™. The WALTHAM™ Equine Studies Group, which is headed by Professor Pat Harris, MA, PhD, VetMB, DipECVCN, MRCVS, is dedicated to advancing the science of horse nutrition and provides the scientific support for Mars Horsecare globally including the BUCKEYE™ Nutrition, SPILLERS™, and WINERGY™ brands. By collaborating with key research institutes and universities around the world its work remains at the forefront of equine nutritional science.

| *Holly Wiemers, MA, APR, is communications and managing director of UK Ag Equine Programs.*



University of Kentucky holds Rotavirus workshop July 19. Generously hosted by Keeneland this workshop overviewed equine Rotavirus in foals and the work performed by UK Gluck Equine Research Center and Veterinary Diagnostic Lab during the Spring of 2021 funded by Gluck's Koller Emergency Response Funds and gifts from the Kentucky Thoroughbred Association/Kentucky Thoroughbred Owners and Breeders, Coolmore America and the Grayson Jockey Club.

The majority of the workshop focused on the discovery of the new Rotavirus B variant found in foals with neonatal diarrhea in 2021, infection control and prevention strategies as well as discussion on Rotavirus A.

Keeneland generously provided its Sales Arena and complimentary light refreshments during the workshop.

Photo courtesy Erin DesNoyers.

HOW FEEDING WILDLIFE CAN INFLUENCE MIGRATION AND THE SPREAD OF DISEASE

Climate change and human alteration of the landscape are changing natural animal migration patterns. These changes can influence and alter wildlife migration patterns which in turn affects wildlife interaction with disease. This can fundamentally impact public and animal health.

As recently as 2018, the Royal College of Veterinary Medicine's Department of Infectious Diseases has been using mathematical modeling to investigate the impact of climate change, habitat alteration and wildlife feeding on migration and disease. Modeling indicates that providing food to wildlife both unintentionally (unsecured trashcans) or purposefully (bird feeder) impact an animal's natural instinct to migrate. Most animals migrate to follow available food sources and to avoid winter. Another important aspect of migration is that it allows animals a period of absence (break) from a habitat that has a built-up source of parasites. During the migration, weaker individuals infected with parasites are not able to survive the journey, therefore migration helps reduce parasite infections in the animal population. Besides parasitism, evidence has indicated that migration lowers the transmission of some pathogens, thus enforcing the importance of migration on infectious disease transmission. Migration is important ecologically as well for natural processes such as nutrient transfer and pollination.

If this natural pattern of migration is interrupted when human-provided food resources are available, this can allow some animals to skip migrating and set up resident populations. This can be devastating in its consequences.



IMAGE COURTESY SABRINA JACOBS.

When animals that have migrated return, resident populations could already be infected heavily with parasites or pathogens, setup their own territories and put returning animals at a distinct disadvantage regarding existing resources. Additionally, the parasite and pathogen season has been effectively extended in resident populations, thereby causing natural methods of lowering parasites and pathogens to lose effectiveness.

With the ongoing destruction of wildlife travel corridors, use and accumulation of pesticides, herbicides and other products that can have a deleterious effect on ecosystems we need to be more cognizant of our impact on local and global levels. Supporting wildlife populations is another part of the 'human intervention puzzle' and we don't always know what the effect will be. These effects may have a massive impact on the species we deal with domestically. Take for example the tale of West Nile virus. This virus was first identified in Uganda in 1937 and was first identified in

the USA in 1999 in New York. It rapidly swept across the U.S. killing birds, affecting horses with often fatal outcomes and infecting man. Thankfully a vaccine against this zoonotic disease was rapidly developed to protect horses and has remained very effective when used properly.

The take home message is that we need to take a wider view look at small acts that can have drastic and far-reaching effects on our agriculture and domestic agricultural animal species. In future articles, we will take a look at how animal movement can affect our insect populations playing a role in spreading disease.

| Jackie Smith, PhD, MSc, MACE, Dipl AVES is an epidemiologist based at the University of Kentucky Veterinary Diagnostic Lab. Emma Adam DVM, PhD, DACVIM, DACVS is based at the University of Kentucky Gluck Equine Research Center and Veterinary Diagnostic Lab and is responsible for research and veterinary industry liaison.

HORSES AND HUMANS IN HEAT AND HUMIDITY

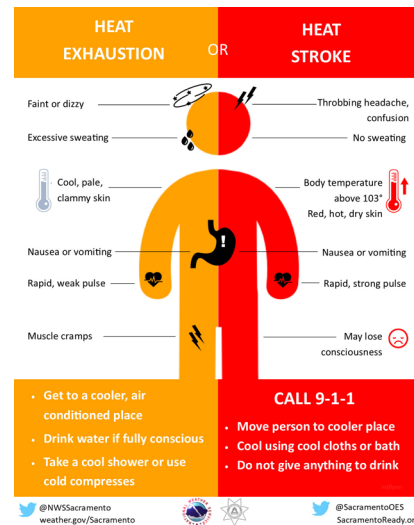
Heat and humidity are part of Kentucky's summer weather landscape. The heat index (temperature + humidity) increases heat stress risk for horse owners and their horses. Unfortunately, for at least the next few days, high heat indices will keep the livestock heat stress index in the "danger" category during the afternoon and evening hours. The combination of high temperatures and humid air from the Gulf of Mexico can push heat indices well over the century mark, making it feel oppressive to be outside.

Longer-range Kentucky outlooks indicate above normal temperatures and below normal precipitation through the end of July and early weeks of August. Below is a look at heat indices and the likelihood of heat disorders based on prolonged exposure to heat.

Heat stress happens quickly, so be sure to practice heat safety. Here are a few tips for humans and horses.

| *Matt Dixon is the senior meteorologist in the UK Agricultural Weather Center, which is part of the Department of Biosystems and Agricultural Engineering. Doctoral student Staci McGill contributed to this article.*

Drink plenty of fluids.	Make sure horses have access to plenty of fresh water.
WEAR SUNSCREEN and dress appropriately (lightweight and light in color).	Offer shaded paddocks and well-ventilated barns. Add fans to increase air flow. If your horse must wear a flysheet, choose a lightweight, light-colored one.
Take frequent breaks in the shade (or air conditioning) and reduce activity during the warmest time of the day. Schedule more strenuous jobs in the early morning or late evening hours.	Avoid riding during the heat of the day. If you must ride during the heat of the day, take frequent breaks and reduce intensity of exercise. Hose your horse thoroughly to cool after riding. Scraping is not necessary.
Know the symptoms of heat exhaustion/stroke.	Know the symptoms of heat exhaustion/stroke.
Follow your local weather forecast so you are aware of Heat Advisories or Excessive Heat Warnings.	Pay attention to livestock heat stress warnings.



Relative Humidity (%)	NWS Heat Index															
	Temperature (°F)															
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution (light yellow) Extreme Caution (yellow) Danger (orange) Extreme Danger (red)

NEW STUDY AIMS TO PROVIDE TARGETED NUTRITIONAL RECOMMENDATIONS FOR EMS/ID HORSES

Obesity is on the rise, not only in humans and companion animals, but also in our beloved horses and ponies. In humans, dogs and cats, we hear the term diabetes mellitus; however, in the horse it is very rare to develop diabetes. Instead, equids of all ages can develop Equine Metabolic Syndrome (EMS).

EMS is composed of three characteristics. Firstly the consistent feature of EMS animals is that they demonstrate insulin dysregulation (ID), a collective term for both tissue insulin resistance and basal/postprandial hyperinsulinemia. This means that typically the concentrations of insulin in the blood are higher than what's considered normal either before and/or after eating feeds and forages especially those rich in starch and/or sugar. Secondly, there is an increased risk of developing endocrinopathic laminitis, which is laminitis resulting from hormonal (in particular insulin) disturbances rather than in association for example with severe infection (sepsis) or certain intestinal conditions. Finally, most, but not all, EMS animals show increased general or regional adiposity meaning that many are overweight or more typically obese.

The main risk factor for endocrinopathic laminitis is now believed to be insulin dysregulation although the exact link between abnormally high circulating insulin concentrations and the development of laminitis is not known. However, it does mean that what we feed our horses may directly impact their risk for endocrinopathic laminitis. Unfortunately, limited work has been undertaken in the EMS/ID horse and our current recommendations were largely derived from horses that suffered from polysaccharide storage myopathy (PSSM), a very different condition. Thus, we set out to explore and, help define nutritional recommendations for EMS/ID horses and thereby improve their welfare.

In our recent publication¹ in

the Equine Veterinary Journal, carried out in collaboration with Pat Harris, MA PhD VetMB DipECVCN MRCVS, head of the Equine Studies group at the Waltham Petcare Science Institute, we fed various feedstuffs to EMS/ID horses as well as healthy horses in two separate studies.

Currently, it is typically recommended that EMS/ID horses are fed low sugar and starch feeds and forages that contain <10-12% non-structural carbohydrates (NSC ie Starch and water soluble carbohydrates) on a dry matter basis with an appropriate ration balancer. In our first study, various feeds with different levels of protein and NSC were fed in a cross-over study to both ID and non-ID horses. The results of this study showed that, even when fed low amounts (~1g/kg BW) of certain feeds that did not provoke any insulin response in Non ID horses, exaggerated insulin responses may occur in ID animals confirming the need to undertake work specifically in such individuals. In addition, the study suggested that non-structural carbohydrates were the main driver behind the post-meal insulin response rather than protein in the ID horse. In our second study we fed diets with a range of NSC contents and showed that under these conditions the threshold for the exaggerated insulin response in ID horses appeared to be between 6-15% NSC on a dry matter basis.

We are currently undertaking a follow-up study, which will hopefully help to identify whether additional starch or sugar is the main driver for the insulin response and further define where the likely NSC threshold range may be when fed such simple diets.

Erica Macon explained that 'when combined with other work showing the potential effects of other nutrients on the insulin response, such as oil inclusion, these results should help with the development of rations that decrease the risk of endocrinopathic laminitis'. As our team is composed of equine



IMAGE COURTESY ERICA MACON.

enthusiasts, we are dedicated to improving our understanding of this endocrine disorder and the welfare of EMS/ID horses.

This work has been generously funded by Mars Horsecare and The Waltham Petcare Science Institute. Thanks are also owed to Pat Harris, PhD VetMB DipECVCN MRCVS, EBVS® European specialist in veterinary and comparative nutrition and member of European College of Veterinary and Comparative Nutrition, and Amber Krotky MS, PAS and manager of quality and product development at Mars Horsecare US, for their support in completing this project.

Erica L. Macon, MS, is a PhD student in the laboratory of Amanda Adams, PhD, MARS EQUESTRIAN™ Fellow and associate professor at the Gluck Equine Research Center.

1 Macon, E.L., Harris, P., Bailey, S., Barker, V.D. and Adams, A., 2021. Postprandial insulin responses to various feedstuffs differ in insulin dysregulated horses compared to non insulin dysregulated controls. Equine Veterinary Journal on line

HELPING VETERINARIANS MANAGE STRESS AND BURNOUT

Like many veterinary students, Addie Reinhard, DVM, went from the protective environment of veterinary school into a clinical practice. She was not prepared for all the stress shifting to the professional world would bring, and it severely curtailed the joy she felt in taking care of people's pets.

"We do what we do to help the people who own the animals, who love the animals and to promote that human-animal bond. I think that when there are things that occur in a practice that prevent us from achieving that, whether that be limitations in finances or limitations in our own skills, it weighs on us," she said.

Reinhard said there were a lot of challenges when she started her career.

"You're going from being a student, where you have lots of checks and a lot of people above you that are making sure all your pets are good, to having full responsibility for your patients. That was tough."

Large caseloads and working in a high stress environment can sometimes overwhelm young veterinarians. Add to that, veterinarians often have a high student debt-to-income ratio, so for some young doctors, it's hard to live comfortably right out of school. "We deal with a lot of situations that are really tough. There are a lot of ethical decisions vets have to deal with every single day, and a lot of it ties to money and (clients') finances," Reinhard said. "Those issues weighed pretty heavily on me. I experienced my own burnout two or three years into practice. I was exhausted. There was a lot of emotional toll."

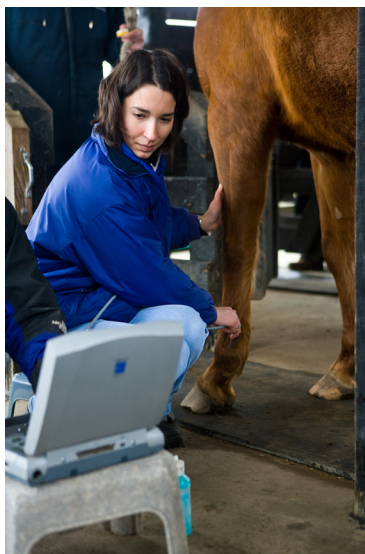


IMAGE COURTESY UK COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT.

When Reinhard looked for some resources to help, she didn't find much. She started looking at other career opportunities within the veterinary profession, public health, teaching or research. She decided to enroll in graduate school at the University of Kentucky to work on a master's degree in community and leadership development, a degree offered by the College of Agriculture, Food and Environment.

"I wanted to create a program to support veterinarians that were feeling burned out and overwhelmed," she said.

The program she created during her UK graduate studies was a mentorship program that included leadership and professional skills training. Seven graduates from Lincoln Memorial University and the University of Tennessee colleges of veterinary medicine, participated in the online pilot program she designed with knowledge she gained from earning the

University of Tennessee Veterinary Human Support Certificate and through her advanced leadership training in the UK Department of Community and Leadership Development.

"A lot of it (my program) was about self-care, but a lot of it was about leadership and how to work through ethical dilemmas, how to be prepared for working with clients with limited incomes and how to feel good about it at the end of the day and not feel like you're a failure. And also conflict, how to work through conflict, because that is common in vet practices," Reinhard said.

Program participants met on Zoom once a month to discuss their experiences in transitioning to practice, connect with other early-career professionals and hone their professional skills.

"Those meetings served as an opportunity for them to feel like they weren't alone in practice and feel like, oh, other people are going through similar things as me," Reinhard said. "Often that can be very beneficial at promoting mental health, that social support aspect, knowing that other people are going through similar struggles and challenges."

Before the program started, the average burnout level of all the newly graduated veterinarians in the study was higher than the burnout levels of the general population. When Reinhard evaluated her study, she found that average exhaustion and cynicism levels – two measures of burnout – decreased over time in veterinarians who had gone through her program, while they significantly increased in veterinarians who were part of the

control group and did not participate in the program.

“The encouraging thing was, this program has the potential to prevent that (burnout) from occurring, to prevent that from getting much worse,” she said. “We know that all of these measures, burnout, well-being, stress, they’re bad for all veterinarians, no matter what the age, but they’re worse for our young veterinarians. The first five to 10 years is the time for the poorest well-being. I think, after you’ve been in practice five, 10 years, you begin to adapt – and I even noticed this transition within myself when I was practicing – you begin to understand and adapt to some of those challenges.”

Reinhard is hoping to continue growing the program, because she sees a real need for something like this. The latest study by the Centers for Disease Control and Prevention found that suicide is 1.6 to 2.4 times more likely among veterinarians than among the general public.

“Suicide is a very complex issue, so there’s not just one thing that creates this issue,” Reinhard said. “I’ve been getting more involved with the suicide piece of this. I’ve been doing suicide intervention training with Southeast Center for Agricultural Health and Injury Prevention, so that’s been an exciting thing.”

Now graduated, she has been invited to be on the research team for the third phase of the Merck Animal Health Veterinary Well-being Study. Merck Animal Health has done two previous national surveys of veterinary mental health, and they are currently performing another survey to track trends in mental health and wellbeing within the veterinary profession.

Reinhard said that anyone with questions about her program can contact her at addiereinhard@gmail.com.

| Carol Lea Spence is an agricultural communications specialist within the UK College of Agriculture, Food and Environment.

EQUINE INNOVATORS PODCAST: HORSE BREEDS AND GENETIC VARIATION



In this month’s podcast, Ernie Bailey, PhD, and Ted Kalbfleisch, PhD, both from the University of Kentucky’s Gluck Equine Research Center, are joined by Jessica Petersen, PhD, from the University of Nebraska-Lincoln, to discuss genetic variation in horse breeds, why it is important and what we will learn from the Thoroughbred Genetic Diversity project.

This podcast is the eighth episode in our “Equine Innovators” podcast series, brought to you by Zoetis. You can find “Equine Innovators” on TheHorse.com, Apple Podcasts, Spotify, Stitcher, and Google Podcast.

About the researchers:

Ernie Bailey, MS, PhD, is a professor at UK’s Gluck Equine Research Center, in Lexington, where he trains graduate students, teaches and conducts research into the genetics of horses.



Ted Kalbfleisch, PhD, has been working in the field of animal genetics for nearly 20 years. He is an associate professor at UK’s Gluck Center, where his research focuses on the use of genetic sequence data to understand the genetic basis of health and disease susceptibility in horses. He led the work that culminated in the 2018 publication of an improved reference genome for the horse and has authored or co-authored more than 60 scientific publications.



Jessica Petersen, MS, PhD, has led genetic studies to define the relationships among and within horse breeds and works to understand how genes of the horse are regulated. She is an associate professor at the University of Nebraska-Lincoln and has led or contributed to over 40 scientific publications and the textbook *The Horse*, 3rd edition.



DO YOU KNOW WHAT WELLNESS PROGRAMMING YOUR ORGANIZATION'S MEMBERS WANT?



IMAGE COURTESY KARIN PEKARCHIK.

The Female Equestrian Health and Wellness Network (FEHWN) aims to address holes in equestrian research and to deliver educational and outreach programs that help advance female equestrians across all disciplines as riders and as professionals.

The FEHWN's consensus paper, published in May 2021, outlined six main points that will drive upcoming research and programming. The six statements, which follow, broadly address the economics of the industry, career pathways, sex/gender distinctions and overall female health and wellness.

1. More scholarly research is imperative to improving health and wellness outcomes of riders and to the economic prosperity of equestrian sport.

2. Equestrian athletes should receive or have access to sport-specific guidelines and training to address the physical and psychological skills required within each discipline of riding in

order to promote health and wellness, improve safety and prevent injury and encourage full participation throughout recreational and professional athletic pursuits and careers.

3. Female equestrian health and wellness issues differ from male issues due to biological (sex) and gender (social and cultural) distinctions.

- Female equestrians should have and will benefit from access to female-sport-specific guidelines and training designed to address female sex and gender needs and expectations.
- With these sex and gender distinctions in mind, research on topics specific to female health promotion and injury prevention and educational programs designed for female well-being within equestrian sports should enable female riders to avoid unnecessary pain and to participate fully in recreational and professional pursuits.

4. Athletic equipment and apparel serve to protect, preserve health and promote optimal performance. Both equipment and apparel designers and manufacturers should consider female anatomy and physiology so that their products can maximize female equestrian function and wellness.

5. Clearly defined development tracks within equestrian disciplines and trades should become a priority for the industry.

6. Many equestrian sports are

sex-integrated, with males and females competing against one another. However, equestrian pursuits are not fully equitable, and all organizations within the equestrian industry should ensure parity of the sexes in opportunities, roles, responsibilities and compensation.

Now that the FEHWN has published the consensus statement, it would like to start addressing the issues. To that end, the FEHWN is inviting equestrian organizations to speak at upcoming FEHWN meetings. This multidisciplinary and cross-border collaboration will help the FEHWN define its initiatives so they are closely aligned with members' health and wellness concerns.

Upcoming research projects may include a breast health and bra fit guide, menstruation/female life cycle research survey and career pathways survey. Subsequent research, education and outreach will be based upon feedback from organizations.

Invitations have been dispatched to individuals at US Equestrian, Pony Club, U.S. Pony Club, Pony Club Australia, Kentucky 4-H, among others. Because of the global nature of equestrianism, representation is needed from international organizations. Representatives who can speak about health and wellness issues are invited to contact Karin Pekarchik at karin.pekarchik@uky.edu.

| *The University of Kentucky Female Health and Wellness Community of Practice (CoP) provided this information.*

SEVERAL UK FACULTY AND GRADUATE STUDENTS RECOGNIZED AT ANNUAL ESS SYMPOSIUM

The Equine Science Society (ESS) is internationally recognized as one of the preeminent equine scientific organizations. The ESS 2021 Virtual Symposium was attended by almost 400 individuals from 18 countries. The virtual platform represents a unique opportunity for individuals to view almost 160 scientific presentations, two keynote presentations, a workshop and live Q&A sessions at their leisure. Interested individuals can register for the Symposium until Aug. 2, and recordings are available for viewing until Sept. 3. To view the Symposium Program and registration information, visit <https://www.equinescience.org/Meetings/2021-Meeting>.

At its 2021 Virtual Symposium, ESS elected the following to its executive committee: president Pat Harris, PhD, VetMB DipECVCN MRCVS, EBVS® European specialist in veterinary and comparative nutrition and member of European College of Veterinary and Comparative Nutrition, from Waltham Petcare Science Institute; vice president Shannon Pratt-Phillips, PhD, North Carolina State University; Secretary Krishona Martinson, PhD, extension program leader, University of Minnesota; and Treasurer Rhonda Hoffman, PhD, director of horse science, Middle Tennessee State University. Additional members of the executive committee include Past-President Burt Staniar, PhD, associate professor of equine science, Penn State University, and executive secretary Bob Coleman, PhD, extension horse specialist, University of Kentucky.

AWARD WINNERS AT THE 2021 ESS VIRTUAL SYMPOSIUM FROM THE GRADUATE

STUDENT COMPETITION

1. **Ashlee Hauss**, a student with Kristine Urschel, PhD, associate professor in UK's Department of Animal and Food Sciences, was third in the Nutrition Section.
2. **Staci McGill**, a student with Morgan Hayes, PhD, assistant extension professor in the Department of Biosystems and Agricultural Engineering, was third in the Production and Management section.

In addition, the following UK Faculty were recognized for Society Awards at the 2021 Virtual Symposium:

DISTINGUISHED SERVICE AWARD



Craig Wood, PhD, Assistant Director Agriculture and Natural Resources. The award recognizes outstanding contributions to the field of equine science and is the most prestigious honor that ESS can bestow upon one of its members.

Wood has been with UK and Cooperative Extension since 1985, when he started work as extension horse specialist. In that role, he was in charge of all adult and youth equine program-

ming within the state, taught undergraduate equine courses and managed the teaching/research facility. He developed and offered an online undergraduate course, ASC 320 Equine Management, and taught several online students from around the country in the late 1990s. Craig has been instrumental in developing and delivering award winning educational web-based material for K-12 students as well as post-secondary students. Wood is well known for his technology leadership. Wood was associate director of the eXtension Initiative. Housed at UK, eXtension provided a one-stop, virtual connection to Cooperative Extension Service specialists across the nation. In 1989, Craig received the Outstanding Young Extension Specialist award and the M.D. Whitaker Excellence in Extension award in 1993. In 1995, he was awarded the Young Animal Scientist Award – Education, by the Southern Section of the American Society of Animal Science. His course The Art and Science of Equine Production was awarded the Best Distance Learning Program in Higher Education in 1993 by Telecon Magazine and the United States Distance Learning Association. In 2004, Craig and the Southern Region Equine Extension Professionals were awarded the Bill Murphy Barrier Buster award and an ACE bronze award for innovative and effective use of technology and the Internet for HorseQuest.info. Craig raises and rides horses, served as President of the American Paint Horse Association and the Equine Science Society. He is also an APHA judge, and an active member of Extension Horses, Inc. Originally

from Texas, Craig received his BS from Texas Tech University, and MS and PhD from New Mexico State University.

2020 ESS -ASAS AWARD



Bob Coleman, PhD, extension horse specialist, Department of Animal and Food Sciences. This award recognizes outstanding achievement in the areas of extension, research, teaching or agribusiness in the equine industry. This award is formally presented at the annual American Society of Animal Science (ASAS) meetings.

Coleman completed his BSc (Animal Science; 1975) and MS (Animal Science; 1978) degrees at the University of Manitoba and his PhD (Equine Nutrition; 1998) at the University of Alberta. He was the extension horse specialist for Alberta Agriculture from 1980 to 1998. In 1998, Coleman moved to UK as the equine extension specialist, where he oversees all adult equine extension activities. In addition to his extension duties, Coleman teaches and advises in the Equine Science and Management program and is the advisor for the UK Equestrian Team. Coleman serves on the AQHA Research committee, is a board member of the Midwest ARPAS, the executive director of the Equine Science Society and the president-elect for the Certified Horsemanship Association. He was awarded the 2019 ASAS Distinguished Teacher Award.

2021 ESS-ASAS AWARD



Kristine Urschel, PhD, associate professor, Department of Animal and Food Sciences. This award recognizes outstanding achievement in the areas of extension, research, teaching or agribusiness in the equine industry. This award is formally presented at the annual American Society of Animal Science (ASAS) meetings. Urschel completed both her BSc (Animal Science; 2002) and PhD (Nutrition and Metabolism; 2007) at the University of Alberta, Canada. Her research program focuses on protein and amino acid nutrition and metabolism in horses, and she employs isotopic and molecular biology techniques in her research. She is one of only a few researchers in the world using stable isotope techniques to study whole-body protein metabolism and amino acid requirements in horses. She has been very successful in securing extramural funding for her program, with sources of funding that include the USDA AFRI competitive grants program, the Morris Animal Foundation, the Waltham-Buckeye Equine Grant and the equine feed industry. She has 30 peer-reviewed publications, is the author of one book chapter and has given invited talks to both national and international audiences.

| *Source: ESS news.*

COMMON EQUINE HEPATOTOXINS IN CENTRAL KENTUCKY

Liver disease in horses can occur due to many causes, including infectious agents, neoplasia and toxicants. Clinical signs are often nonspecific, and can include inappetence, depression, colic, weight loss, weakness, icterus (jaundice), yawning, head-pressing, abnormal behavior and coagulation abnormalities. Toxic agents can vary tremendously depending on an animal's environment and geographic location. This article describes some of the hepatotoxicants (liver toxins) that affect horses in central Kentucky.

PYRROLIZIDINE ALKALOIDS (PAS)

PAs are found in a variety of plant species and can cause chronic liver disease and eventual liver failure with prolonged ingestion. Due to the liver's immense reserve and regenerative capacity, horses can appear normal until greater than 80% of the liver is affected. Severe clinical signs can then develop rapidly, giving the appearance of acute disease. PA-producing plants found in Kentucky include ragwort, butterweed, groundsel and rattlebox (*Senecio*, *Packera*, and *Crotalaria* spp.). Most PA-producing plants are unpalatable when fresh, although horses may eat them when other forage is lacking. The plants become palatable when dried and can pose a greater threat in hay. Poisoning can be prevented by providing high-quality forage and checking hay for weeds.

COCKLEBUR (*XANTHIUM STRUMARIUM*)

Cocklebur seedlings (two-leaf stage) contain large quantities of the toxin carboxyatractyloside. Seedlings emerge in early spring when other forage is limited and are readily consumed by horses. High concentrations of the toxin

are present in the seeds, and horses have been poisoned by cocklebur seed contamination of hay or grain. Cocklebur poisoning can be prevented by providing high-quality forage and inspecting hay and grain for cocklebur seeds.

AFLATOXIN

A mycotoxin produced by species of *Aspergillus* molds under certain conditions. Aflatoxin can contaminate corn, oats or any other high-energy feedstuff. Mold can contaminate crops growing in fields, particularly if the plants have been stressed by drought, frost, insects or other harmful elements. Warm and damp storage conditions and pests also facilitate mold growth. Aflatoxin can be present in toxic concentrations with or without visible mold. To avoid the risk of mold and mycotoxins, feed should be purchased from reputable sources; stored in a cool, dry location; and adequately protected from rodents and other pests.



IMAGE BY SHUTTERSTOCK.COM, | PJ PHOTOGRAPHY.

BLUE-GREEN ALGAE (*CYANOBACTERIA*)

Under the right environmental conditions, these microscopic organisms normally present in ponds, lakes, streams, oceans and other natural water sources can undergo rapid growth (harmful algal blooms, HABs). Certain

species produce toxins, including hepatotoxins (e.g., microcystins and nodularins). Horses can die rapidly after ingestion, and animals are often found dead in or near water sources. Excess nitrogen and phosphorus from animal waste or fertilizer runoff can facilitate HABs. Horses should be provided with fresh, clean water and ponds or other natural water sources should be fenced off to prevent blue-green algae poisoning.

AMANITIN

Toxin found in certain species of mushrooms, including *Amanita*, *Galerina* and *Lepiota* spp. Mushrooms can appear suddenly in pastures and occasionally in stalls. Horses are less likely to ingest mushrooms than other animal species, but the best way to prevent poisoning is to monitor pastures and remove mushrooms.

Certain medications (e.g., phenylbutazone, flunixin, acetaminophen, salicylates, antifungals and many others) can cause liver damage, especially if administered in high doses, for prolonged periods of time or to animals with pre-existing conditions. Accurate dosing and careful consideration of medication risks versus benefits can help minimize chances of adverse effects. Many other substances can cause liver damage and may be more common in different geographic areas. Consultation with a clinical veterinary toxicologist should be considered when toxicosis is suspected.

| *Source: July Equine Disease Quarterly. Megan Romano, DVM, DABVT, is the toxicology section supervisor at the University of Kentucky Veterinary Diagnostic Laboratory.*

EQUINE HERPESVIRUS 1 REVISITED: SIGNIFICANCE AND CONTROL STRATEGIES

Equine herpesvirus 1 (EHV-1) is the most significant equine herpesvirus in terms of equine health and economic impact to equine industries worldwide. EHV-1 is believed to have co-evolved with horses over millions of years. This co-evolutionary relationship resulted in the development of a life-long carrier state in a high percentage of infected horses. This involves viral latency (silent infection) of various sites (trigeminal ganglia in the central nervous system, respiratory lymphoid tissues, and CD3+ T lymphocytes in the blood). Latency ensures perpetuation of EHV-1 by serving as a virus reservoir for infection and dissemination in susceptible populations. It is no wonder that EHV-1 is ubiquitous in horse populations worldwide.

A wide range of clinico-pathological syndromes are attributed to EHV-1 infection. EHV-1 infections can result in respiratory disease in foals and 2 to 3-year-old horses in training; contagious abortion in mares; congenital disease and death in foals infected in utero; and neurologic disease (myeloencephalopathy) in horses of variable ages, especially older animals. Less frequently encountered EHV-1 diseases include: retinouveitis in foals; fatal generalized peracute disease (pulmonary viscerotropic infection) in young adult to older adult horses; intestinal ganglioneuritis and impaction; and scrotal edema and loss of libido in stallions. EHV-1 was implicated as the agent responsible for annual occurrences of “abortion storms” in the Thoroughbred breeding population in Kentucky at least as far back as 1933 and is widely acknowledged as the most significant cause of

equine contagious abortion in many countries. Implementation of sound management practices and prophylactic vaccination of pregnant mares have, where practiced, greatly reduced the frequency of EHV-1 abortion storms. Susceptible mares exposed to EHV-1 late in pregnancy may carry to term but give birth to a diseased foal that invariably succumbs from fulminant viral pneumonitis. Unless appropriate biosecurity measures are taken, there is a high risk that affected foals can serve as a source of infection through direct or indirect means for healthy foals and pregnant mares.

The clinical syndrome that has attracted the most concern in recent years is equine herpesvirus myeloencephalopathy (EHM). This syndrome has been recorded with increasing frequency in North America and Europe over the past 20 years (Figure 1). In 2007, the USDA designated EHM caused by a hypervirulent strain of EHV-1, a potentially emergent disease of the horse. EHM tends to be seasonal with increased case numbers in winter and spring.

A comprehensive biosecurity plan is critical to prevent and control outbreaks of EHM. Optimally, its aim should be to prevent the introduction of an equine pathogen viz. EHV-1 onto a premises, be it a farm or event venue (equestrian, racetrack, horse show), by whatever measures are considered appropriate and necessary. This is especially important when dealing with an EHM outbreak. In such a situation, the primary aim should restrict the spread of infection at the index premises/ facility by quarantine of infected and exposed

horses. Furthermore, every effort should be made to ensure that the outbreak is effectively contained and eliminate the possibility of virus spread to other premises/ facilities. Restriction of movement of exposed horses off an affected premises is crucially important, and failure to observe this precautionary measure carries a considerable risk of EHV-1 spread that can have very significant consequences. This was exemplified at the NCHA Western National Championship at Ogden, Utah in May 2011, when exposed horses departed the event and subsequently spread EHV-1 to 12 U.S. states and two Canadian provinces. An analogous situation occurred at the CES Spring Tour in Valencia, Spain in February 2021. During the extensive EHM outbreak at this event, a significant number of exposed horses were transported back to their countries of origin. The outcome was calamitous with multiple horses developing neurologic disease, some of which died or were euthanized.

Equine herpesvirus 1 remains a highly significant pathogen that has the potential to cause a range of clinical syndromes in the horse and can have considerable economic consequences for equine industries.

| *Source: July 2021 Equine Disease Quarterly. Peter J. Timoney, MVB, PhD, FRCVS, is a professor and the Frederick Van Lennep Chair in Equine Veterinary Science at the Gluck Equine Research Center.*

TWENTY YEARS' EXPERIENCE WITH WEST NILE VIRUS, 2001-2020

Until 1999, West Nile (WN) virus was unknown in the Western Hemisphere, much less the USA. In August of that year, the virus was identified in New York City and caused the deaths of seven persons from viral encephalitis. Coincidentally, the virus was also implicated in the death of birds in New York's Bronx Zoo and crows in the precincts of the zoo.

West Nile virus is a mosquito-transmitted arbovirus, member of the Japanese encephalitis virus serocomplex, family Flaviviridae, known for many years to be a highly adaptable virus, as evidenced by its extensive distribution throughout the Old World. As such, it was no surprise that WN virus spread rapidly from its presumed point of introduction in New York. It initially extended southwards along the eastern seaboard, while also migrating westwards into the hinterland of the USA. With the exception of Alaska and Hawaii, WN virus had reached the remaining 48 states by 2004. The virus was later confirmed in Alaska in 2018.

Kentucky reported its first cases of WN virus in birds and horses in 2001 (Figure 1). Devastating losses were recorded in crows and other members of the corvid family, and eight cases were diagnosed in horses in counties in the north-central part of the state. In 2002, the virus dramatically spread throughout much of Kentucky with the exception of the eastern part of the state. To date, 2002 was witness to the greatest number of cases recorded in horses (513), humans (75) and birds in Kentucky. Case numbers in horses (102) and humans (14) declined significantly the following year. With the exception of minor surges in horse cases in 2006, 2012, 2013, 2017 and 2018, the annual number of reported cases of infection

remained in single digits. With the exception of 2006 and 2013, the same years also saw corresponding minor surges in human cases (CDC, ArboNET). Cases of WN virus infection have been confirmed in horses every year since 2001 and, with the exception of 2020, also in humans.

The seasonality of equine WN infections, based on the weekly onset of illness, was consistent with other arboviral encephalomyelites (Figure 2). Apropos of the 765 equine cases of infection recorded in Kentucky since 2001, the onset of virus activity ranged from early June to mid-July, depending largely on the level of mosquito activity in any particular year. The peak of infections occurred approximately mid-September, and virus activity ceased by mid-November.

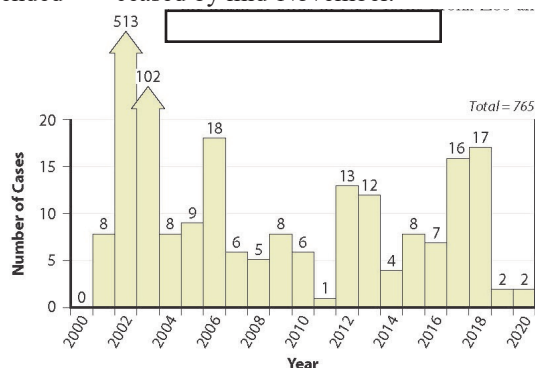


Figure 1. Annual number of equine cases of WN virus infection in Kentucky, 2000-2020.

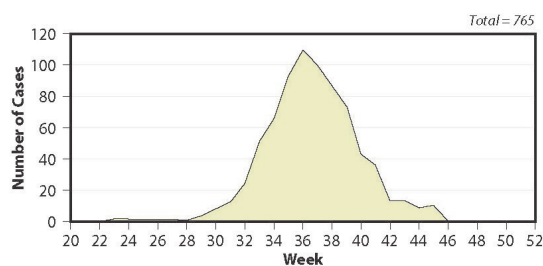


Figure 2. Cumulative equine WN virus cases of infection by weekly onset of illness in Kentucky, 2000-2020.

A breakdown of the 20-year total of WN virus infections in Kentucky revealed that the most common horse breeds/categories included American Quarter Horses, Tennessee Walking Horses, Thoroughbreds and pleasure horses, of which

American Quarter Horse and Tennessee Walking Horse comprised almost 50% of the overall number. Females outnumbered males 57% to 43%. Ages of confirmed WN cases ranged from 3 months to 39 years, with a median of 8 years. Of the 765 total cases, 541 (71%) survived and 224 (29%) died or were euthanized.

The first equine vaccines against WN virus-related disease received conditional licensure from the USDA in 2001. Even though vaccination is effective in protecting against disease, the great majority (86%) of WN cases recorded in Kentucky had never been vaccinated or were only partially vaccinated (10%). Only approximately 4% of cases had current vaccination histories. While this is not totally surprising, it is disappointing considering that WN virus is one of five core equine vaccines strongly recommended by the American Association of Equine Practitioners. Of the 656 cases of WN infection without prior vaccination history, approximately 30% died or were euthanized. Greater efforts are therefore needed to encourage horse owners to take advantage of vaccination if continued losses from WN virus infection are to be reduced or even eliminated.

This review confirms that WN virus has become endemic in Kentucky and will likely continue to cause horse and human disease. Its broad host and vector range, capability for transovarial transmission in mosquitoes, and horizontal transmission in birds and a diversity of mammals has ensured its perpetuation.

Source: July 2021 *Equine Disease Quarterly*. Peter J. Timoney, MVB, PhD, FRCVS, is a professor and the Frederick Van Lennep Chair in Equine Veterinary Science at the Gluck Equine Research Center.

KENTUCKIANS SHOULD CHECK THEIR BOXWOODS FOR BOX TREE MOTHS

University of Kentucky entomologists and the U.S. Department of Agriculture are asking Kentuckians to monitor their boxwoods for a potentially serious insect pest, the box tree moth. Boxwoods purchased this spring are at the highest risk for the moth.

“The box tree moth is another emerging pest that has the potential to have serious economic impacts for the state’s green industry,” said Jonathan Larson, PhD, extension entomologist with the UK College of Agriculture, Food and Environment.

Potentially thousands of moth-infested plants entered the United States in May in shipments from Canada. These shipments went to Tennessee, South Carolina, Connecticut, Massachusetts, New York, Michigan and Ohio. While Kentucky did not receive an infested shipment, potentially infested boxwoods were found in nine Kentucky landscapes. One person purchased plants from an online retailer in South Carolina. Others purchased boxwoods from a retail chain with a distribution center in Tennessee. The Kentucky Office of the State Entomologist worked with the homeowners to contain the pests and to prevent a widespread infestation.

“Everyone who received the material was very cooperative and allowed the plants to be taken and destroyed,” said Joe Collins, senior nursery inspector with the Office of the State Entomologist. “They also allowed us to place an insect trap with a pheromone specifically for the box tree moth in their yard as a preventative measure. The traps will be checked in mid-August at which time the



IMAGE COURTESY UK COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT.

pheromone will be replaced with a new pheromone lure. In mid-September, the traps will be removed.” Boxwoods are extremely popular in Kentucky and American landscapes and a huge economic driver for the state’s green industry, with many nurseries shipping plants across the country.

A native of east Asia, the moth has been in Europe since 2006. There it is a serious invasive insect and continues to spread. The moth has been in Canada since 2018. Box tree moth females lay their eggs on the backs of boxwood leaves. Once they hatch, moths live only about two weeks, so Kentuckians could see several generations from now until September.

“The caterpillar stage of the moth will begin feeding on leaves, then move to the stem, and eventually kill the plant,” Larson said. Larson encouraged Kentuckians to look for signs of box tree moth damage on their boxwoods, especially young plants. This damage includes translucent leaves and webs on leaves similar to those of

a tent caterpillar. Additional signs include chewed, cut or missing leaves, yellowing or brown leaves and green-black excrement on or around the plant. The caterpillars are green and yellow with white, yellow and black stripes and black spots. Moths have brown borders around their wings and white centers.

If homeowners suspect they have damage from the box tree moth or see the caterpillars, they should contact Larson at jonathan.larson@uky.edu or their local USDA office, who can confirm an infestation and destroy any infested plants.

| *Source: July 15, 2021 College of Agriculture, Food and Environment news release. Katie Pratt is an agricultural communications specialist.*

2021 UK Equine Farm & Facilities Expo

Tuesday, Sept. 28 3:30 - 8:00 p.m.



Schedule:

- 3:30: Registration and trade fair
- 4:00: Farm tours begin, every 15 minutes
- 5:30: Dinner
- 6:00: Welcome and highlight from Spendthrift Farm, "Engaging non-horseman in the racing industry"
- 6:30 - 8:00: Educational stations
 - Farm layout & planning, Dr. Bob Coleman & Dr. Morgan Hayes
 - Establishing new pasture, Dr. Jimmy Henning & Krista Lea
 - Spray options for farms of all sizes, Dr. Bill Witt

Location:

Spendthrift Farm, 247 Swaggert Drive, Lexington
Please do not use the main farm or breeding shed entrances.
These will be closed.

 SPENDTHRIFT

 University of
Kentucky

Ag Equine Programs
College of Agriculture, Food and Environment