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## 2018 UK Equine Research Hall of Fame Inductees Announced



From left to right: Dr. Thomas Divers, the late Dr. Steeve Giguère, and Dr. Dickson Varner will be inducted into the Equine Research Hall of Fame on Oct. 31.

The University of Kentucky (UK) Gluck Equine Research Foundation will induct three scientists into the UK Equine Research Hall of Fame Oct. 31 at the Hilary J. Boone Center on UK's Lexington campus.

Nominated by their peers and colleagues, Thomas Divers, DVM, Dipl. ACVIM, ACVECC; the late Steeve Giguère, DVM, PhD, Dipl. ACVIM; and Dickson Varner, DVM, MS, Dipl. ACT, were selected by other Equine Research Hall of Fame members for induction.

"Induction into the UK Equine Research Hall of Fame provides the opportunity to recognize the many important contributions these individuals have made to the health and well-being of horses in the areas of pathophysiology, infectious disease, and reproduction," said David Horohov, PhD, chair of the Department of Veterinary Science and director of the Gluck Equine Research Center.

### **Thomas Divers, DVM, Dipl. ACVIM, ACVECC**

Divers is the Rudolph J. and Katharine L. Steffan professor of veterinary medicine at Cornell University, in Ithaca, New York. His research focus has changed over the decades based on emerging medical disorders and equine research needs. He has collaborated with other researchers on studies on:

- The first description of equine herpesvirus-1 (EHV-1) neurologic syndrome in the southeastern United States;
- The efficacy and oral bioavailability of trimethoprim/sulfadiazine and permitting its labeling for equine use;
- Red maple toxicity in horses;

- Numerous diseases of the nervous system, kidneys, and liver in horses and cattle;
- The cause, epidemiology, and pathophysiology of equine motor neuron disease;
- Lyme disease and leptospirosis in horses; and more.

His current research focuses on the cause of Theiler's disease (serum hepatitis), where collaborative studies revealed two new equine viruses, one of which appears to be a likely cause.

He received his bachelor of science degree from Virginia Polytechnic Institute in 1971 and graduated from the University of Georgia College of Veterinary Medicine in 1975. He completed an internship at University of California, Davis, and an internal medicine residency at University of Georgia. Divers is a diplomate in the American College of Veterinary Internal Medicine and the American College of Veterinary Emergency and Critical Care.

"It is a tremendous honor to be selected for induction into the Equine Research Hall of Fame," Divers said. "I am particularly humbled to have my name even mentioned with the list of previous inductees because I am, at best, a clinical researcher who has most often used a variety of clinical problems and clinical cases as the basis for my research.

"Any successes that I may have had

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## Equine Research Hall of Fame Inductees

in equine research are a direct result of my collaborations with many wonderful colleagues, both those in universities and those in private practice,” he continued. “I would like to thank all of those collaborators and would like to recognize two collaborators who have passed—Dr. Doug Byars (DVM, Dipl. ACVIM), who was an early collaborator and longtime friend, and Dr. Bud Tennant (DVM, Dipl. ACVIM) for our nearly four decades pursuit of a cause of Theiler’s disease. It is my hope that some of our research findings have made a difference to the health of the horse.”

### Steve Giguère, DVM, PhD, Dipl. ACVIM

Giguère was a professor and Marguerite Hodgson chair in equine studies at the University of Georgia, in Athens, when he died unexpectedly on May 27. He was an equine infectious diseases and comparative immunology researcher. Most of his research focused on infectious disease pathogenesis in foals, specifically *Rhodococcus equi*; antimicrobial agent pharmacokinetics; and clinical monitoring of septic foals.

He graduated from veterinary school at the University of Montreal in 1992. He completed his internship at the University of Montreal and his residency at the University of Pennsylvania. He earned his doctoral degree in veterinary microbiology and immunology at the University of Guelph. He became a diplomate in the American College of Veterinary Internal Medicine in 1997.

He received multiple teaching and research awards throughout his career, including the Carl Nordern-Pfizer Distinguished Teaching Award in 2006, the Intervet/Schering Plough World Equine Association Applied Equine Research Award in 2009, and the Zoetis Award for Research Excellence in 2017.

Paul Lunn, BVSc, MS, PhD MRCVS, Dip. ACVIM, dean of the North Carolina State University College of Veterinary Medicine, nominated Giguère.

“Dr. Giguère was the star of his generation and, although his life was cut tragically short, he still contributed some of the most important equine research work in the areas of infectious disease for more than two decades,” Lunn said in his nomination. “He

established an international reputation as an equine researcher with a specific interest in infectious disease and neonatology.”

### Dickson Varner, DVM, MS, Dipl. ACT

Varner is a professor of equine theriogenology and the Pin Oak Stud chair of stallion reproductive studies at Texas A&M University, in College Station. His research has a translational emphasis, with a focus on understanding mammalian sperm function, identification of stallion fertility probes, expanding in vitro methods for preserving cooled and frozen stallion sperm, capacitation of stallion sperm, development of assisted reproductive techniques, and subfertility in stallions. He identified a defect in the sperm’s acrosome, the “cap” on the sperm’s head that secretes enzymes required to penetrate the egg, which severely interferes with some stallions’ fertility. He also helped develop the use of computer-assisted sperm analysis for semen evaluation and a variety of ways to improve storage, transport, and insemination of stallion sperm. These techniques ultimately help increase equine reproductive success.

He earned his bachelor of science degree in 1976 and graduated from veterinary school in 1978 at the University of Missouri. He worked as an assistant resident veterinarian at Castleton Farm, in Lexington, Kentucky, from 1978-1981 before completing his residency at the University of Pennsylvania. He earned his master of science degree from Texas A&M in 1990. He is a diplomate in the American College of Theriogenologists. Through this college, he received the Theriogenologist of the Year Award in 2002 and the Bartlett Award for Lifetime Achievement in Theriogenology in 2016. Notable invited national and international presentations include the Milne Lecture (American Association of Equine Practitioners; 2007), the Bain Fallon Memorial Lecture (Australia; 2012), and the Nick Mills Memorial Lecture (London, UK; 2017).

“I am so moved to be inducted into the University of Kentucky Equine Research Hall of Fame,” Varner said. “I began my veterinary career in Lexington under the tutelage of Dr. H. Steve Conboy (DVM). I recall speaking at the inaugural induction ceremony regarding

## Masthead

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## Equine Research Hall of Fame Inductees

my mentor, the late Dr. Robert M. Kenney (DVM, PhD). It is such an honor to be included in the same Hall of Fame as someone that was my guiding light during my fledgling years as an equine reproductive specialist and continues as an inspiration to me

to this day. The hall of fame abounds with esteemed scientists, and it is such a humbling, but fulfilling, experience to be included among them.”

Equine Research Hall of Fame nominees can be living or deceased, active in or retired from equine research. Established in 1990, the UK 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. Find a list of past inductees at [gluck.ca.uky.edu/content/equine-research-hall-fame](http://gluck.ca.uky.edu/content/equine-research-hall-fame). **UK**

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

## UK's Gluck Center Welcoming Stanley as Analytical Chemistry Professor

Scott Stanley, PhD, a professor at the University of California, Davis (UC Davis), has accepted the professor of analytical chemistry position at the Gluck Equine Research Center.

He will join the UK Department of Veterinary Science's faculty in a few months.

“The continued use of performance-enhancing substances remains an area of concern to both human and equine athletic endeavors,” said David Horohov, PhD, department chair and center director. “The Gluck Center has ongoing interest and expertise in the field of equine pharmacology and toxicology, and Dr. Stanley will further that reputation and enhance our ability to do state-of-the-art research in this important area.”

Stanley received his bachelor's degree in animal science in 1988 and his doctoral degree in toxicology in 1992, both from UK. He has been a faculty member at UC Davis since 1997. Previously he served as the director of toxicology at Truesdail

Laboratories, in Tustin, California.

At UC Davis, Stanley is the director of the Kenneth L. Maddy Equine Analytical Chemistry Laboratory. He modernized drug testing in California horse racing by introducing new state-



of-the-art equipment and procedures. He also worked closely with manufacturers in adapting these newer, more sensitive instruments to equine drug testing.

“My current research interests are related to drug testing methods for the detection of biopharmaceuticals, natural products, and designer drugs,” Stanley said.

His research at Gluck will focus on developing new anti-doping approaches and establishing an equine biological passport project.

“The College of Agriculture, Food and Environment, and the signature industry that we serve, are extremely lucky to have Dr. Stanley back in our community,” said Nancy Cox, MS, PhD, dean of the college. “Dr. Stanley has earned an

international reputation for sound application of the best technologies to pharmacology in the horse. His presence here will give a quantum leap to our already well-established programs dedicated to safety in racing and all other equine sports.”

Stanley has authored or co-authored more than 150 peer-reviewed publications, along with three book chapters on anabolic steroids, beta-2 agonists, and therapeutic drug thresholds for racing. He is a member of the Association of Official Racing Chemists and the American Society of Mass Spectrometry.

“The addition of Dr. Stanley to join the world-class faculty

assembled at the Gluck Center represents the essence of commitment made by the University of Kentucky to the equine industry locally and beyond the borders of the commonwealth,” said Stuart Brown, DVM, chair of the Gluck Equine Research Foundation and partner and veterinarian at Hagyard Equine Medical Institute. “Dr. Stanley's area of expertise in analytical toxicology and drug testing will augment the contributions made by the Gluck Center in novel areas of research and discovery to the benefit of the health and welfare of the horse for decades to come.” **UK**

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

## Comparing Horse Arena Footing Measurements, Descriptions

The world's leading show jumper keeps arena surfaces of different venues in mind when he selects a horse for an event.

“Some jump better on grass, others on sand, and for others the differences are more subtle,” Kent Farrington said after receiving the Longines Fédération Equestre Internationale (FEI) World's Best Jumping Rider award earlier this year. “You have to know what works for each horse and plan accordingly.”

While that might make sense, riders can't always know what the surface is like before they head off to show. They could call the organizers or other riders who know the arena to get their

## Footing Terminology

feedback. But aside from the difference between grass and sand, how can you describe different arena surfaces' firmness, cushioning, springiness, grip, or consistency? What exactly do those terms mean, and do they mean the same thing for everyone?

"What we're lacking is an objective way to measure arena qualities so that everyone's speaking the same language, from riders to organizers to designers to suppliers," said Lars Roepstorff, DVM, PhD, professor of equine functional anatomy at the Swedish University of Agricultural Sciences, in Uppsala, and FEI scientific veterinary advisor.

That's why he teamed up with Mick Peterson, PhD, director of the UK Ag Equine Programs, faculty member within UK's Biosystems and Agricultural Engineering Department, and executive director of the Racing



Terms to describe arena surfaces remain subjective, and not everyone agrees on what's "good" and "bad" when it comes to footing, researchers found.

Surfaces Testing Laboratory; Elin Hernlund, DVM, PhD; and other colleagues to examine the reliability of a biomechanical arena surface measuring system. They sampled footing in 25 arenas and assessed the material with the Orono biomechanical surface tester, originally designed in 2008 for testing Thoroughbred racetracks.

Then, they asked high-level riders to evaluate those same surfaces themselves to see if their subjective opinions lined up with the scientists' objective scores. Altogether they received completed questionnaires from nearly 200 riders that detailed their perceptions using an established terminology.

In 2014, international scientists joined up to create the *Equine Surfaces White Paper* that included definitions of the kinds of terms riders use to describe horse arena footing. It was an effort, Roepstorff said, to harmonize the way people talk about arenas.

The terminology section defined six common terms, five of which Roepstorff and his fellow researchers used for their subjective evaluation questionnaire in their study:

- Impact firmness;
- Cushioning;
- Responsiveness;
- Grip; and
- Uniformity.

The sixth term, consistency over time, was not explored in the current study because the scientists were looking at immediate evaluations and not the way surfaces change over time.

The team found that the Orono tester scores aligned well with the riders' subjective evaluations for impact firmness, they said. Scores were fairly consistent for cushioning and grip, as well.

However, rider evaluations did not agree with Orono test results on responsiveness. In fact, the scientists said, they tended to contradict each other. Meanwhile, evaluations regarding uniformity of the surface seemed to have no correlation whatsoever with the biomechanical findings for that quality.

Furthermore, while those were the overall results based on an average of all 198 riders that answered the questionnaire, the riders had significant differences from one individual to another, Roepstorff said. There was relatively little harmony of agreement among the riders in describing the surfaces.

This means the equestrian community still hasn't reached a point where it can objectively—or subjectively—compare or discuss horse arena footing in a reliable manner, especially for qualities such as responsiveness and uniformity, they said.

While the *Equine Surfaces White*

## GRAD STUDENT SPOTLIGHT

### ALISA HERBST

**From: Bitz, Germany**

**Degrees and institution where received:  
BSc in equine science and management,  
Nuertingen-Geislingen University, in  
Germany**

It has always been Alisa Herbst's dream to study at the UK Gluck Equine Research Center.

"The PhD program at the Gluck Center is a unique opportunity for me, as I get to learn from world-renowned researchers and study in my main field of interest: equine immunology," she said. "In addition, I'm provided with excellent advising, exceptional resources for my dissertation research, and I get to work with fantastic colleagues."

Herbst is currently studying under Amanda Adams, PhD, associate professor at the Gluck Equine Research Center, and is working on improving the understanding of inflamm-aging (chronic low-grade inflammation) in aging horses. She is characterizing muscle mass loss and function in senior horses and exploring exercise as a measure to reduce inflamm-aging and reduce muscle mass loss and function in old equids. All of these projects are aimed at improving the understanding of the growing senior horse population's needs.

When asked what her most valuable takeaway was from the program, Herbst said, "Research is a team effort, and that's what makes it so much fun.

"I have made great friends here at UK, and planning and conducting studies with everyone in Adams' lab has been a wonderful experience," she said.

Herbst plans to graduate in 2020. After graduation, she hopes to gain more research experience as a postdoctoral researcher, perhaps in the field of human medicine. Eventually, she would like to be involved in establishing Germany's first veterinary science program. **UK**



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

## Footing Terminology

*Paper's* terminology section has been helpful, it still isn't sufficient for describing surfaces, Roepstorff said.

The terms remain subjective, and not everyone agrees about what's "good" and "bad" when it comes to footing.

"It all depends on your situation—the kind of horse you have, your home training conditions, your personal preferences, how you work," Roepstorff said. "It's like me asking you, 'What's a good car?' What's good for me might not be good for you."

The important thing, he said, is

to have clearly defined "product specifications" for arenas like we have for other products—cars or washing machines, for example.

"How much horsepower does the car have? Is it manual or automatic? How fast is the spin cycle in this washing machine? Does it do delicates?" he said. "All these things help us make the right decisions for our individual needs and preferences by laying out reliable characteristics that everyone can understand. And that's what we need to head toward with arena surfaces, as well."

Objective horse arena footing characteristics could also help people

better train horses for events when the horse is expected to compete regardless of the surface, Roepstorff said. They can also help facilitate communication between suppliers, designers, and organizers, so they can work together to agree on the arena surface for each venue.

Their work is ongoing.

The study, "Comparing subjective and objective evaluation of show jumping competition and warm-up arena surfaces," was published in *The Veterinary Journal*. [UK](#)

>Christa Lesté-Lasserre, MA, is a freelance writer based in Paris, France.

## Fall Nitrogen Application Benefits Pastures Year-Round

Fall is prime time to invest in pastures to protect them before and throughout the winter to ensure good grazing in the spring. Most cool-season horse pastures should be fertilized with nitrogen in the fall to boost root reserves and extend the grazing season. Other fertilizers can also be added in the fall, based on soil test results.

### Applying Fall Nitrogen

Nitrogen applied in the spring or summer boosts grass growth significantly, but many farms are unable to utilize this additional growth and ultimately mow it down instead.



PHOTOS COURTESY KRISTA LEA

Nitrogen and some other fertilizers can easily be spread using a cone seeder on the back of an all-terrain vehicle. Be sure all equipment is functioning properly and that the seeder is calibrated correctly to apply the desired amount of fertilizer.

growing season. Additionally, a strong spring pasture will have better cover, which reduces annual weeds.

For best results, apply 40 to 50 pounds of actual nitrogen per acre to pastures once or twice throughout the fall.

If using urea (46-0-0), increase applications to 85 to 105 pounds per acre. Applications can be anytime between September and the first hard freeze (overnight temperature of less than 20 degrees F) and should be a minimum of six weeks apart.

Rather than wasting good grass, consider applying nitrogen to cool-season pastures in the fall.

Fall nitrogen will not greatly increase grass growth, but it will boost grasses' root reserves, allowing plants to remain greener longer into winter, survive winter better, and green up sooner in the spring, effectively prolonging the

You can spread nitrogen fertilizers easily using a cone seeder on the back of an all-terrain vehicle or tractor. Horses do not need to be removed from pastures if equipment is operating properly and not leaving large pellet piles. Do not fertilize when grass leaves are wet, as fertilizer pellets can stick to the leaf surface and cause damage.



The plot on the left was clipped close, but fertilized heavily with nitrogen and potassium. The one on the right was clipped high, but not fertilized. No amount of fertilizer will compensate for poorly managed pastures.

### Other Fertilizers

Unlike nitrogen, other soil amendments such as phosphorus, potassium, and lime should be applied only after a soil test. Apply only the recommended amounts, as additional inputs are costly, do not benefit the pasture, and have the potential to run off into nearby water bodies.

While mixed fertilizer bags, such as 10-10-10 or 19-19-19, are convenient, they might not fully fertilize of one component without overfertilizing another. Contact your local county extension agent for help with soil sampling.

### Good Pasture Management

While maintaining good soil fertility is essential to productive pastures, so is good management. No amount of fertilizer can compensate for overgrazed pastures. Fall is also the time to assess how well pastures performed throughout the year and make plans for next year. Rotating horses between two or more pastures provides grasses with rest and will ultimately result in greater production and fewer weeds. [UK](#)

>Krista Lea, MS, research analyst and coordinator of the UK Horse Pasture Evaluation Program within the Department of Plant and Soil Sciences; and Ray Smith, PhD, professor and forage extension specialist within UK's Department of Plant and Soil Sciences, provided this information.

## EIA: What's the Big Deal?

Each year, like clockwork, our veterinarians take blood samples from our horses during spring health exams. We sign the forms, and off the tubes go to the lab for the Coggins test. We do this year in and year out, with no positives and no questions asked. So why do we keep up with this annual horse care ritual?

The Coggins test checks for antibodies against the equine infectious anemia virus (EIAV). This virus is significant because much like the human immunodeficiency virus (HIV), its lentiviral cousin, there is no vaccine and no cure. A horse diagnosed positive for equine infectious anemia (EIA) dies, is euthanized, or gets placed under extremely strict quarantine conditions (at least 200 yards away from other equids) for the rest of his life.

### How Do Horses Get EIA?

The EIA virus passes from one horse to another via blood. Biting flies, such as horseflies, deerflies, and stable flies, can transmit it after feeding on an infected horse.

"Unlike flaviviruses such as West Nile virus or Zika virus, EIAV does not replicate in insect tissues, and so the infective dose is limited by the amount of blood that can be carried on the fly's large mouthparts," says UK professor Frank Cook, PhD. "EIAV survives for less than four hours on fly mouthparts.

If something interrupts a horsefly's meal, then the probability of it biting another host is inversely proportional to its distance from the next target. "The further away a potential new host is, the more likely the fly is to return to its original victim," he says. "It was discovered that if a new horse host was tethered at distances of 50 yards or more, it was virtually (although not entirely) immune from attack, as the fly would almost invariably return to the original host."

### What the Virus Does

EIAV attacks the horse's immune system. Clinical signs include muscle weakness, progressive loss of condition, and poor stamina. An affected horse might also develop a fever, depression, and anemia.



COURTESY DEBBIE BEYE-BARWICK/FRIENDS

Infected horses, like this one at FRIENDS Horse Rescue & Sanctuary, often show no outward signs of disease, but they must be branded as EIA-positive and quarantined for life if not euthanized.

The disease has three phases of infection—acute, chronic, and inapparent carrier—yet not all affected horses develop all phases. Many acutely infected horses die; survivors suffer from the disease's chronic impacts. Others mount an immune response and persist as carriers.

Most infected horses develop some level of anemia—red blood cell or hemoglobin deficiency—while still looking fit and fine and able to perform as intended, says Angela Pelzel-McCluskey, DVM, MS, equine epidemiologist of Surveillance, Preparedness, and Response Services at the USDA Animal and Plant Health Inspection Service's Veterinary Services. Those that develop an acute crisis experience severe hemolytic anemia (red blood cell destruction) and are likely to die. Most infections, however, seem to progress to a relative state of remission, yet these horses still provide a reservoir for viral infection either by way of insect vectors and/or iatrogenic sources (people and medical treatment). What's more, the underlying anemia might reduce a horse's resistance to contracting another disease, such as equine piroplasmiasis.

Researchers believe that EIA survivors mount a sufficient immune response to control the extent of the disease in their bodies, says Cook.

"Studies inducing suppression of the immune system with corticosteroid

administration resulted in increased blood-associated virus levels and in some cases recrudescence (reappearance of clinical signs) of disease," he says. "Therefore, it is thought that stress of an inapparent carrier and/or age-related degeneration in the immune system causes that individual to be an active source of infection to others."

### Is EIA on the Rise?

Equine infectious anemia is an insidious yet controllable disease. Due to close surveillance, the number of cases confirmed in the United States declined over the past few decades.

"When testing first began in the early 1970s with the development of the Coggins test, approximately 4% of all equids tested were positive for antibodies to EIAV," says Cook. "Removal of these test-positive subjects from the population by the beginning of the 1980s resulted in only around 0.5% test-positives; today the incidence is less than 0.01%."

In 2001 testing identified 534 EIA-positive horses, whereas in 2015 only 69 horses of nearly 1.5 million tested were confirmed positive. Recent observations, however, show the number of cases on the rise again.

Pelzel-McCluskey describes a disconcerting development in the United States: "Between 2009 and 2013, there were an average of 40-plus cases

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per year," she says. "It was felt that there was a steady-state prevalence at our given level of surveillance of 1.5-2 million horses tested each year. But, in the last few years, there has been an uptick in positive cases. The most disturbing trend is that this is due to an increased number of iatrogenic cases, particularly in Quarter Horse racehorses and unsanctioned bush track racing."

Prior to 2013 USDA-accredited veterinarians did not recognize iatrogenic EIA cases as contributing significantly to the total case number. But by 2013 Pelzel-McCluskey noted that about 25% of annual EIAV infections were caused by iatrogenic transmission. In 2014 alone, 54% of EIAV positives were traced back to a potentially preventable iatrogenic origin.

Iatrogenic infection occurs through contaminated blood or blood products, shared needles, or blood-contaminated hands, dental equipment, or other instruments contacting another horse.

**"Today the incidence (of EIA in the equine population) is less than 0.01%"**

DR. FRANK COOK

"Residual blood volume in a used syringe and needle can be 5,000- to 10,000-fold greater than that carried by even the largest horsefly, and the virus is viable for at least four days," Cook says. "Horsefly transmission pales to almost insignificance compared to human-related spread and perpetuation of EIAV. If it was not for iatrogenic transmission, EIAV would be of little significance today."

Katie Flynn, BVMS, equine staff veterinarian for the California Department of Food and Agriculture, says that from 2012 through 2015, testing confirmed 39 racing Quarter Horses as positive for EIAV in California alone. "Epidemiologic investigations indicate that the majority of the positive horses participated in Quarter Horse racing and had potential exposure to high-risk practices, such as sharing of needles and other medical

equipment or the use of contaminated blood products," she says.

Sources of iatrogenic infection that currently plague Quarter Horse racing and bush track racing horses include:

- Reuse of needles and syringes on different horses.
- Contamination of multidose drug vials by inserting a used needle and/or syringe that deposits blood (with virus) into the bottle. "Infected blood contained within the hub of a used syringe or needle contaminates the drug vial, resulting in disease spread with subsequent drug administrations to additional horses," says Flynn.
- Reuse of intravenous (IV) tubing—invariably when using tubing to connect to an IV catheter, there is blowback of blood into the tube that cannot be cleaned out with water or even antiseptic solutions.

- Improper cleaning and sterilization of lip tattoo equipment.

- Blood doping, particularly of bush track horses—this technique takes blood from one horse and gives it to another via IV transfusion.

- Possible use of unlicensed blood or plasma products imported illegally from other countries, including Mexico and South America.

And, there's another disease on the rise that can be transmitted via these methods: equine piroplasmiasis. "A critical point is that these blood-borne infections are totally preventable transmissions," says Pelzel-McCluskey.

She suggests veterinarians caring for these high-risk groups of horses always test for blood-borne infections such as EIAV and piroplasmiasis. Knowing that these animals are at high risk of infection provides veterinarians

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## EIA: What's the Big Deal?

an opportunity to educate owners about potential sources of iatrogenic infection, she says.

A 2006 outbreak among 29 horses in Ireland illustrates what risks a single iatrogenic EIA infection can pose. "The 2006 Irish outbreak was initially caused by transfusion of a contaminated unlicensed horse plasma product probably from Eastern Europe, and there was also at least one transmission resulting from the reuse of a catheter by a veterinarian," Cook says.

This outbreak in Ireland was unusual, he says, because several cases might have been caused by aerosol transmission subsequent to power-washing at facilities where EIAV-positive horses were identified.

"The sick mare at the Irish clinic was not initially suspected of being infected with EIAV," says Cook. "However, she experienced one common clinical sign of acute EIA—hemorrhage due to severe thrombocytopenia (loss of platelets necessary to clot blood). Several liters of her blood contaminated the floor, with as much as 1 million infectious EIAV particles per mL of blood. Cleanup of the blood spill with a pressure hose might have aerosolized millions of infectious EIAV particles, each small enough to

enter the lung and deliver viruses to lung macrophages (white blood cells) to cause infection. Only those horses present at the clinic at the time of the mare's hemorrhage became infected. Those that left before or came after were not."

### There's No Vaccine

Vaccines stimulate horses' naturally occurring protective immune responses against microbial pathogens. "Unfortunately," says Cook, "Lentiviruses such as EIAV do not stimulate natural, fully protective immunity. In part this is because they have a high mutation rate, which is difficult for a vaccine to duplicate. This is why billions of dollars and many different vaccine approaches against lentiviruses, including HIV and EIAV, have mostly been unsuccessful."

Because of the difficulty in protecting against EIAV with immunization, the only successful approach is through surveillance and testing.

### All-Important Testing Policies

EIAV infection is limited to equids so, theoretically, it is possible to eliminate the virus from countries where the incidence is low, such as the United States. However, the key factor is compliance, making this a political issue rather than a solely veterinary one, says Cook.

In regard to EIA testing in the U.S., Cook describes two equid populations: "Those that compete and show or move across state lines are tested frequently, whereas those that live out their lives on the same farm may not be tested at all. It is usually within this second group that new cases are discovered, for example, if an owner dies or decides to offer a horse, donkey, or mule for sale, and EIA testing is required or pursued. Therefore, the discovery of new EIA cases in North America is often the result of a chance event."

Horses that travel out of state and to clinics and shows where a negative Coggins test is required for entry get tested for EIAV repeatedly. Such a "clean" population continues to be tested every year and, so, remains clean. The main danger of EIAV exposure in the frequently tested population of traveling, competing, showing, and breeding horses is if they mingle with animals from the nontested group.

For instance, a clean horse could encounter an untested Quarter Horse that participated in unsanctioned or illegal races—particularly if he's already moved on to a second career. Because these horses tend to be natural athletes, many go on to jumping, eventing, or barrel racing careers, for example.

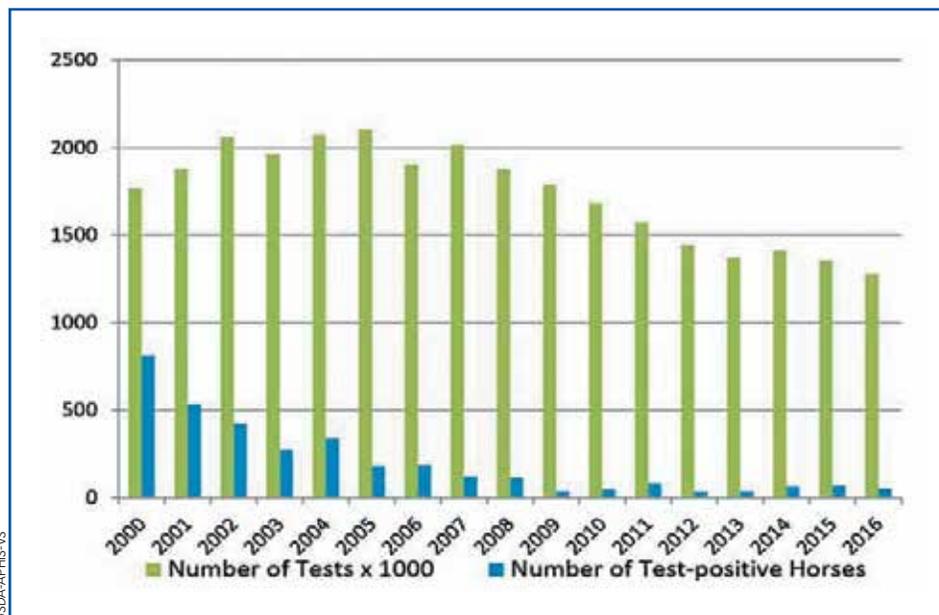
"This can result in an infected horse serving as a reservoir for horses in other disciplines that might otherwise be 'clean,'" says Pelzel-McCluskey.

"Racing Quarter Horses exposed to EIA at a young age that go undiagnosed pose a risk to the equine population," adds Flynn. "Horse owners should be aware of this potential risk and consult their veterinarian to determine appropriate testing prior to purchase, particularly of a former racing Quarter Horse."

Each state oversees regulations on horse movement into that state; most adhere to requirements for EIAV testing every 12 months and, in some cases, every six months, says Pelzel-McCluskey. There has been some discussion about codifying the 12-month requirement into a federal rule, but for now there is no established national EIA surveillance program.

Another concern, Pelzel-McCluskey says, is that our southern neighbor,

Reported number of U.S. EIA tests and positives, 2000 to 2016



## EIA: What's the Big Deal?

Mexico, has no control program or testing for EIAV. With that in mind, she says, we probably won't be able to ever give up on routine EIAV testing in the United States, due to the high risk of infection sources from south of the border.

She says long-established untested herds can lead to large clusters of positive EIAV cases. And for some of these herds, it's not due to owner noncompliance. For example, in 1998 the BLM rounded up a group of wild horses in Utah to reduce herd numbers. Testing revealed that 10% were infected with EIAV. Cook says EIA had likely been circulating in the Utah wild horse population for decades and was only discovered during the roundup. This could pose a threat to the domestic horse population via fly transmission.

Other potential natural reservoirs exist in the United States. Tribal lands out West, for instance, have untested herds, as do some religious groups, such as the Amish in New York and Pennsylvania, says Pelzel-McCluskey. Additionally, large domestic horse herds in the western United States and elsewhere might end up being dispersed following their owners' death or retirement. As these horses go to sales, testing might identify positive cases.

### Take-Home Message

The responsibility is on each of us as horse owners to continue routinely testing our horses for EIAV to control disease spread. The recent increase in positives each year is attributable to iatrogenic sources, yet transmission is preventable through education and testing.

Flynn says EIA prevention relies on obtaining a negative EIA test prior to a horse's entry into a herd and not sharing blood-contaminated equipment such as needles, syringes, IV sets, multidose vials, or dental or surgical equipment.

Anytime you have a horse evaluated for purchase, travel, or health, be sure to have him tested for EIAV. **UK**

>Nancy S. Loving, DVM, owns Loving Equine Clinic in Boulder, Colorado, and has a special interest in sport horse care.

## Mineral of the Month: Calcium

The first recorded use of calcium (Ca), and perhaps unknowingly so, was in the form of limestone and gypsum. Builders and construction workers used the compounds in many different applications but, most interestingly perhaps, the ancient Egyptians used them in constructing the pyramids. Later, doctors recorded that gypsum was particularly useful to set broken bones; however, it was only in the 1700s that researchers discovered Ca was a component of bones themselves.

Most of the Ca (almost 99%) in a horse's body is found in bones and teeth. However, Ca also has other important bodily functions. For example, it plays a role in muscle contraction, cell membrane function, blood clotting, and some enzymes' function, as well. As such, the body must regulate blood Ca concentrations carefully. To do so, bone can act as a storage pool for extra Ca, but it is always best if a horse's diet provides sufficient Ca.

The National Research Council's *Nutrient Requirements of Horses* (NRC, 2007) recommends that a mature idle horse weighing 500 kilograms (1,100 pounds) consume 20 grams of Ca daily. This requirement increases to 30 to 40 grams per day for the same horse in light to heavy exercise. Calcium requirements for pregnant mares (weighing 500 kilograms) only increase about midway through pregnancy to 28 grams per day and topping out at 36 grams per day toward the end of pregnancy (NRC, 2007). Early lactating broodmares have the highest Ca intake recommendations, starting at 59 grams per day for a 500-kilogram horse, tapering off throughout lactation. Growing horses have high Ca requirements to support growth and bone health, as well (NRC, 2007).

Forages typically contain higher Ca levels than grains. However, legumes (e.g. alfalfa) on average contain more than twice the amount of Ca than do grass forages. Therefore, while grass forages might be sufficient to meet some horses' Ca requirements (such as idle mature horses), alfalfa hay will generally provide more Ca and more closely meet growing horses' higher Ca needs than a grass forage.

Commercial concentrate feeds also often include a Ca supplement. Calcium can be added to a concentrate feed as either an organic (e.g. calcium-amino acid proteinate) or inorganic (e.g. calcium chloride or calcium carbonate) form. When feeding such a commercial feed in addition to forage, as per the feed manufacturer's instructions on the bag, your horse's Ca requirements should be met. However, you should contact an equine nutritionist or veterinarian if you have any questions regarding your horse's Ca intake. **UK**

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

Growing horses have higher Ca requirements than idle, mature horses to support growth and bone health.



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**Biosecurity: Protect Your Horse From Disease**



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How can you keep your horse healthy when going to shows and other events, or when new horses arrive at a barn? Roberta Dwyer, DVM, MS, Dipl. ACVPM, an equine extension veterinarian and professor at UK, and Joseph Lyman, DVM, MS, director of professional services and product development at Neogen, share practical biosecurity measures to protect your horses in this hour-long podcast.

Listen at [TheHorse.com/ATHL-Biosecurity](http://TheHorse.com/ATHL-Biosecurity).

**Upcoming Events**

**Oct. 25 – 4-5 p.m.**

UK Department of Veterinary Science  
Equine Diagnostic Research Seminar  
Series

**Topic:** Respiratory Management

**Speaker:** Morgan Hayes, PhD, PE,  
University of Kentucky

**Location:** UK Veterinary Diagnostic  
Laboratory, Lexington

**Oct. 31 – 10-11 a.m.**

Mary Passenger Memorial Lecture Series

**Topic:** Stallion Fertility Cases:

Demonstrating the Impact of Translational  
Research on the Thoroughbred Breeding  
Industry

**Speaker:** Dickson Varner, DVM, MS, Dipl.  
ACT, Texas A&M University

**Location:** UK Gluck Equine Research  
Center auditorium, Lexington

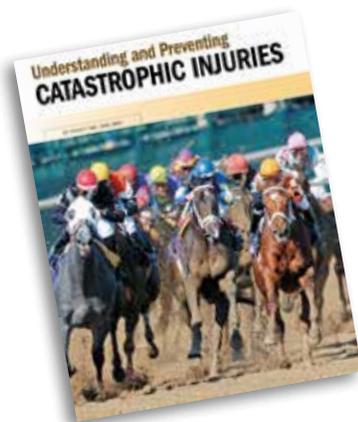
**Oct. 31 – 6-9 p.m.**

UK Equine Research Hall of Fame  
Induction

**Location:** Hilary J. Boone Center at UK,  
Lexington

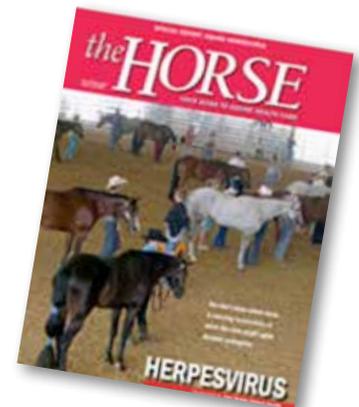
Ticketed event and RSVP required.

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