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## Surface Testing: Keeping Horse and Rider Safety in Mind



Engineers inspect tracks prior to a race meet or before a change in season, depending on how long the venue operates each year, to ensure it is fully prepared for a safe competition.

ANNE M. EBERHARDT/THE HORSE

### PART ONE: AN INTRODUCTION TO SURFACE TESTING

*This is the first in a series of articles looking at the testing and maintenance of equine competition surfaces worldwide.*

No matter the discipline—be it a horse race, show jumping competition, dressage test, reining pattern, or any other equine events that take place every year—all have one singular requirement they need to take place: appropriate and safe footing.

Creating and properly maintaining arena and racetrack footing is important not only for equine injury prevention but also for rider safety. In recent years it's been a growing research focus for scientists around the world. One of those researchers, Mick Peterson, PhD, is the director of the University of Kentucky (UK) Ag Equine Programs, a faculty member within UK's Biosystems and Agricultural Engineering Department, and executive director of the Racing Surfaces Testing Laboratory (RSTL).

The RSTL, founded by Peterson and

Wayne McIlwraith, BVSc, PhD, DSc, FRCVS, Dipl. ACVS, a professor at Colorado State University's College of Veterinary Medicine and Biomedical Sciences, has a more than 10-year history of examining surfaces at racetracks and equestrian sports venues worldwide, developing protocols and standards, and offering recommendations. Peterson is considered one of the world's premiere experts in testing of high-level competition surfaces.

Regardless of whether the RSTL team is working on a track (dirt, turf, or synthetic) or arena, its objective of

surface testing remains the same. Here, we'll focus on racetrack surface testing; a later article will address arenas.

"The goal (of surface testing) is to create a consistent surface and to meet the needs of the event," Peterson said.

Ensuring racetrack surfaces meet the established criteria is fairly straightforward, he said. One parameter the surface testing team can use to determine if the surface is doing its job well is race times for a particular day. However, it is critical on those occasions when a horse is injured and/or safety questions arise that complete data is available to ensure the safest possible surface is provided for racing.

Testing track surfaces involves examining its composition, as well as how the footing performs during use. Once investigators perform these tests, they can make recommendations for improvement, whether it be the footing's contents or how it's maintained.

Surface testing isn't a one-time event; rather, it's a regular part of track maintenance. Part of their goal is to ensure proper long-term surface maintenance. The Maintenance Quality System (MQS), which Peterson and the RSTL developed, involves a methodical approach of assessing and maintaining the surface prior to every event; it also assists track maintenance workers in enhancing the maintenance protocols already in place.

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## Surface Testing

The first step in the MQS is to document all necessary information about the surfaces, including track design and footing materials, as well as maintenance equipment and protocols used. RSTL engineers work closely with the track maintenance crew to obtain all the necessary information. This information can help the investigators and track maintenance crew make informed decisions about improving the maintenance protocol going forward. Elements such as the local climate and surface materials make each track unique in how it must be maintained.

Then, engineers inspect the track prior to the race meet or before a change in season, depending on how long the venue operates each year. The inspection is carried out with plenty of time before the event to allow the track maintenance team to make necessary adjustments to ensure the track is fully prepared for a safe competition. The main tool investigators use for this pre-meet inspection is the Orono biomechanical surface tester, or OBST, which replicates the speed, direction, and impact of a horse's leading hoof traveling at a gallop. The OBST allows for consistent testing of track responsiveness, cushioning, firmness, and consistency. Researchers can compare this data to information from other tracks tested with the OBST. Footing safety and consistency are the primary concerns when performing the inspection prior to a race meet.

Finally, RSTL employees use that data collected to develop a daily

maintenance tracking routine. The maintenance team will inspect the track at the same time each day and record measurements (such as moisture content) in the MQS database. They can access the database on handheld devices during the daily process to compare previous days' data with the current measurements. This helps them keep the track as consistent as possible, as it will display clear trends in the track data, and maintenance protocol can be continued as is or adjusted as necessary.

Because the MQS testing is a continuous process, track maintenance workers can keep improving track surfaces using Peterson's knowledge, along with information the MQS provides.

Although there are many aspects of testing track surfaces and ensuring surfaces are in top condition, Peterson said one goal of surface testing and maintenance stands out to him.

"My primary interest is in the safety of the horse and rider," he said. "Many participants are focused on the performance aspects, but to me that is peripheral. When we talk racing, the biggest risk to the rider is a catastrophic injury to the horse. So we need to keep the horse upright and the rider up to protect the rider and horse."

In Peterson's opinion, the "gold standard" that defines surface testing and development's success is the Equine Injury Database, as this data shows whether surface improvements have made a difference in the horses' and riders' safety and well-being. [UK](#)

>Maddie Regis, a junior majoring in marketing, is the communications and alumni relations intern for UK Ag Equine Programs.

## Masthead

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### ■ The Horse: Your Guide To Equine Health Care

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## Feeding the Healthy Senior Horse

There's good news for owners of senior horses: Finding the "ideal" ration to keep your aging horse healthy and at an appropriate weight doesn't have to be rocket science. In fact, his ration might not even need to change just because he's got a few more gray hairs around his eyes. Still, owners should consider some key points when feeding their seniors.

Sarah Ralston, VMD, PhD, Dipl. ACVN, shared her tips for feeding senior horses at UK's senior horse care mini-symposium, held last September in Lexington. She recently retired from her long-held post as a professor in the Department of Animal Sciences at Rutgers, The State University of New Jersey, in New Brunswick.

"Many senior horses (more than 20 years old) are healthy, happy animals that do not need any special nutrition or care," she said.

If a healthy older horse is thriving on the ration he's been consuming for years, there might be no need to change it solely because he's reached a certain age.

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## Feeding Senior Horses

"If (the diet) ain't broke, there's no need to fix it!" Ralston said.

Geriatric horses, however, might benefit from dietary adjustments. There's an important distinction between old and geriatric horses, Ralston stressed, as the former term simply refers to chronologic age while the latter means a horse has one or more health problems. But first, she said, take the time to carefully evaluate the horse's current health status and diet:

- Assess the horse's current rations and the nutrients they provide. Generally speaking, healthy senior horses might require higher levels of protein, phosphorus, and restricted (but not below normal) calcium and crude fiber than younger, mature horses, Ralston said. If you're unsure whether your horse's current diet meets his needs, consult an equine nutritionist or your veterinarian for help;
- Determine whether he is over- or underweight. Of course, this will dictate whether your aging equid needs fewer or more calories in his diet;
- Have his teeth thoroughly examined to identify any abnormal dentition. Ralston specified that your veterinarian should perform a full mouth exam with a speculum to ensure potential issues, such as hooks on the back molars and missing molars, aren't overlooked. Poor dentition can reduce horses' chewing ability, which can lead to an increased choke risk or reduced nutrient intake;
- Before changing to a feed designed specifically for seniors, consult your veterinarian to determine whether your horse could have kidney or liver dysfunction, both of which are not uncommon in older horses, Ralston said, and can impact an ideal ration significantly;
- Ask your vet to check your horse's pituitary and thyroid function. Horses with thyroid or pituitary dysfunction could have reduced glucose tolerance and/or low vitamin C levels and, as such, could require a different ration;
- Ensure the horse is on a regular deworming schedule. Ralston said her research in the 1980s and '90s suggested that chronic gastrointestinal (GI) tract scarring due to parasitic infection could lead to reduced phosphorus and protein retention but



If a healthy older horse is thriving on the ration he's been consuming for years, there might be no need to change it solely because he's reached a certain age.

that since the release of modern oral dewormers in the 1970s, the GI tract scarring seems to be less prevalent and, therefore, less of an issue. "However, more recent research has shown that horses over 20 years of age that are geriatric do not respond as well to dewormers and should be monitored more carefully," she said; and

- Take a close look at social environment. If the horse has lost weight, it could be the result of getting chased away from feed by other herd members. Simply separating horses at feeding time could help ensure they're each consuming their allotted rations (and no one else's).

Ralston also noted that older horses, especially those with arthritis, tend to thrive on movement. She advised against keeping them stalled or confined to small spaces for long periods, unless prescribed due to another medical condition.

Also, older horses tend to be less tolerant of temperature extremes, so ensure they have adequate shelter, she said. Shelter from wind and snow in winter (i.e., run-in sheds and/or wind blocks) and high heat (i.e., shade) in the summer will help, she added.

### Feeding Recommendations

As discussed, healthy old horses don't necessarily require a diet that's substantially different from what they've been consuming throughout their adult years. But if they are not doing well on their current rations and after a thorough veterinary evaluation, Ralston recommended:

- Choosing a pelleted, cubed, or extruded concentrate that is forage-based, but formulated for senior horses;
- Avoiding textured sweet feeds (primarily processed grains with added molasses) for old horses with metabolic issues; and
- Providing free-choice forage and/or hay, "as long as horses' dentition allows for it, even if it is on the 'senior' complete ration," she said. "Horses like to chew!"

For otherwise healthy horses with dental issues, she said to consider adding easy-to-chew alternative fiber sources to the diet, such as soaked hay cubes or pellets or soaked beet pulp.

Some senior horses might benefit from these supplements, said Ralston:

- Vitamin C (0.02 gm/kg body weight) might help horses with compromised immune function (such as chronic

## Feeding Senior Horses

skin infections or hoof abscesses); however, it shouldn't be supplemented without careful consideration. "Once (vitamin C supplementation is) initiated, it will need to be continued for life or tapered off very slowly," she cautioned.

- Vitamin E (500 to 1,000 IU/day) might benefit horses without access to fresh forage (i.e., grass) and those suffering from recurrent infections.
- An anti-inflammatory product and/or glucosamine/chondroitin sulfate

supplement might benefit horses with arthritis issues. Discuss these with your veterinarian.

Senior horses with kidney and liver dysfunction have more specialized dietary requirements:

**Kidney dysfunction**—Limit calcium and phosphorus intake in horses with kidney issues to only their normal daily requirements (consult your veterinarian or equine nutritionist to find out how much your horse needs), and keep their protein intake at 10% of their total if they have elevated blood urea nitrogen concentrations. At the same time, increase their vitamin D intake (as the



For healthy older horses, choose a forage-based pelleted, cubed, or extruded concentrate that's been formulated for senior horses.

kidney is less effective at synthesizing it) but keep the dose to 500 IU or less per day, Ralston said.

Feed grass hays without significant legume (alfalfa or clover) content and concentrates containing corn, oats, barley, and/or molasses (contrary to what is recommended for a healthy older horse, she noted), and add oil to the diet if horse needs more weight. Also avoid beet pulp and bran, she said.

**Hepatic dysfunction**—Horses with liver failure require a diet higher in soluble carbohydrates (i.e., grain-based concentrates; again, she noted, this is contrary to what's recommended for healthy older horses) and the vitamins niacin and vitamin C (which are synthesized in the liver). In addition, the ration should be lower in protein (8-10% of the diet) and fat (less than 5%) than the average older horse, Ralston said.

### With All That Said...

Yes, specific rations benefit older horses with certain health issues. However, Ralston said, "it's better to feed a less-than-ideal ration than to feed nothing at all."

Some senior horses are notoriously picky about what they eat, she said. So, for example, if the horse with kidney dysfunction turns his nose up at grass hay in favor of alfalfa, or the one with liver problems will only eat a feed that happens to contain soybean meal, it's better to let them eat what they will rather than drop weight because they're not a fan of the perfect ration.

If you have questions about feeding your senior horse, work with your veterinarian or an equine nutritionist to develop a program that will meet his nutrient needs. **UK**

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

## GRAD STUDENT SPOTLIGHT

### ERICA MACON

From: Fort Pierce, Florida

Degree and institutions where received:

**BS in animal science, University of Florida;**

**MS in horse science, Middle Tennessee State University.**



Erica Macon is pursuing her doctorate degree in the department of veterinary science at UK, an institution she said she chose because of the opportunities the program offers.

"I could clearly see myself growing as a scholar and intellectual," she said. "Equine professionals are easily accessible for networking and collaborating, which allows for more research opportunities."

Macon said her current position offers every opportunity for her to be successful and believes it gives her the best opportunity to help horses.

At UK she works with a herd of horses with endocrine diseases, including pituitary pars intermedia dysfunction, equine metabolic syndrome, and insulin dysregulation. Macon works with Amanda Adams, PhD, an assistant professor at UK's Gluck Equine Research Center.

"She is one of the main reasons I came to UK," Macon said. "Everyone praises her for her great personality and mentoring ability, and she has been wonderful to work with."

Macon's research focuses on equine immunology and endocrinology. She's carrying out her program in collaboration with Mars Horsecare, a division of the Waltham Center for Pet Nutrition, and Pat Harris, MA, VetMB, PhD, Dipl. ECVCN, MRCVS. Her goal is to investigate how diet, exercise, and season impact metabolic and inflammatory responses in horses with endocrinopathies. The outcome of this research could provide researchers with more knowledge to improve the management of these horses, specifically those with insulin dysregulation that are more prone to laminitis.

When asked what her most valuable takeaway from the program was to date, Macon said, "a great deal can be accomplished when you work with a great group of people in your lab."

"I have already completed two projects toward my dissertation and a semester of classes," she said. "Without the group of individuals I work with, I would not have been able to finish those projects and begin my third project. Research is a group effort, and I am very thankful for the individuals that I get to work with."

Macon's tentative graduation date is May 2021. After graduation she hopes to remain in academia and gain a faculty position with both research and teaching components. **UK**

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



## Cold Spells Stress Livestock

require a concentrate in their diets to meet the increased calorie needs due to the colder temperatures. Owners adding concentrate for the first time should do so gradually to prevent digestive upset.

In addition, horses need shelter from wind and precipitation. It's also important for horses to have access to clean water to reduce the risk of impaction colic. Owners need to take extra time observing horses during cold snaps, as some will need extra attention and care.

Ambient temperatures can impact the amount of dry matter cattle eat, providing an opportunity to compensate for increased maintenance energy needs. Producers either need to increase their animals' feed intake or increase the

diet's energy density by feeding higher-quality hay or adding more grain or fat to the grain mix, Lehmkuhler said.

He recommended producers monitor cows during the winter to make sure animals maintain body condition.

"Poor-quality hay may not provide adequate energy to maintain gestating cows that are entering the third trimester," he said. "Consider having your hay tested to determine if you need to supplement during times of possible cold stress, especially for the enduring cold spells."

He said to consider separating younger and thinner cows that might not have the same internal insulation as conditioned older cows, and supplement them accordingly or offer them higher quality forage if available.

Coleman said horse owners can

employ similar strategies and separate and feed animals according to body condition score.

"Producers should move cows to fields with natural windbreaks or provide man-made windbreaks, which are not the same as a barn," Lehmkuhler said. "Poorly managed barns combined with poor ventilation may actually hamper efforts to improve the environmental conditions. Remember, energy, or calories, are what animals really need. If the protein level in the forage is adequate, do not make supplement decisions based on protein level; rather, purchase the most affordable calories.

The lower critical temperature (LCT) value for cattle is the lowest temperature or wind chill at which cattle require no additional energy to maintain core body temperature.

"As the temperature declines below this lower critical value, the maintenance energy value for the animal is increased to maintain core body temperature," he said. "Animals maintain core body temperature by increasing their metabolism resulting in greater heat production, as well as other heat conservation strategies such as reducing blood flow to the extremities, shivering, and increased intake."

Lehmkuhler said several things can influence lower critical temperature value.

"Both external and internal insulation influence the LCT," he said. "External insulation is basically the depth and thickness of the hair coat, condition of the hair coat, and thickness of the hide. Thin-hided breeds such as dairy cattle tend to have a lower insulating factor than most beef breeds. The condition of the hair coat is extremely important as an external insulation barrier."

The hair coat acts as insulation similar to home attic insulation that traps air, enhancing the insulating value. If the hair is wet and full of mud, air is excluded, reducing the insulating value and increasing heat loss from the skin to the environment. The hair coat's density and if it is wet or dry impact the wind chill temperatures at which cold stress is considered mild, moderate, or severe. As little as 0.1 inch of rain can immediately impact cold stress severity by matting the hair down, reducing its insulating ability. Acclimation time, hide thickness, fat cover, and other factors will also influence the degree of cold stress that animals experience.

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## Cold Spells Stress Livestock

Extreme cold can have other detrimental impacts on livestock. Frostbite on bulls' scrotums can reduce fertility for a couple of months. Lehmkuhler recommended that all bulls have a

breeding soundness exam conducted by a veterinarian prior to the breeding season, especially after a severely cold winter. Additionally, he said, those expecting calves during winter months should be prepared to warm newborns if needed. Advanced planning to warm calves born in winter months can

increase newborn survival.

For more information about agricultural weather visit the UK Ag Weather Center at [weather.uky.edu](http://weather.uky.edu). **UK**

>Aimee Nielson is an agriculture communication specialist in the UK College of Agriculture, Food and Environment.

## Kentucky Alfalfa and Stored Forage Conference Scheduled

The Kentucky Forage and Grassland Council and UK will host the 37th annual Kentucky Alfalfa and Stored Forage Conference on Feb. 22. This daylong conference will begin at 8 a.m. CST and continue until 3:30 p.m., at the Cave City Convention Center, in Cave City.

The conference focuses on teaching attendees how to maximize alfalfa production and utilization. With presentations from UK College of Agriculture, Food and

Environment specialists and other industry representatives, participants will hear about topics such as alfalfa establishment and export markets.

Intermittent breaks and opportunities for discussion will be provided. The event also offers lunch for attendees and a silent auction. Attendees are welcome to browse exhibits during breaks.

Registration is \$30 per person before Feb. 15 and \$40 after. Sponsor fees are

MATT BARTON, UK AGRICULTURAL COMMUNICATIONS



A field of alfalfa in Scott County, Kentucky.

\$250, including an exhibit booth and one general registration. Register online at [KYAlfalfa2018.eventbrite.com](http://KYAlfalfa2018.eventbrite.com).

More information on the conference and directions

to the convention center are available on the UK forage extension website at [www.uky.edu/Ag/Forage](http://www.uky.edu/Ag/Forage). **UK**

>Madison Dymont is the UK Agricultural Communications intern.

## UK Veterinary Pathologist Recognized on Kentucky Senate Floor

Uneeda Bryant, DVM, a veterinary pathologist from the UKVDL, spends a lot of time teaching school children about the laboratory's role in safeguarding animal health in Kentucky and career options in veterinary medicine and other science-related fields. For her efforts, Senator Reginald Thomas recently recognized her on the Kentucky Senate floor.

The citation stated Bryant was "recognized for her many outstanding achievements in the field of veterinary science and for her continued efforts to utilize her substantial talents to encourage young people, particularly young women, to enter into science-related fields."

Thomas said, "Dr. Bryant is a most accomplished scholar in the field of veterinary science. She has published numerous articles in that field. But what's most attractive to me about her and why I really want to honor her is that she gives back. She's mentored and encouraged a lot of young people to

enter science-related fields. We all know how important it is to get young people to go into science. I really respect her and admire her for doing that."

Bryant was surprised when Thomas invited her to the Kentucky Senate.

"I am humbled by this recognition," she said. "I see my role as an outreach opportunity to teach youth about a nontraditional career path in veterinary

medicine, as well as educating the community about the plethora of services offered at the UKVDL."

Craig Carter, DVM, MS, PhD, Dipl. ACVPM, UKVDL director, added, "I am extremely delighted to see Dr. Bryant's veterinary outreach to our Kentucky youth be recognized by the Kentucky Senate. She has generously donated so much of her personal time for many years to develop and deliver educational programs in veterinary medicine and pathology for young Kentuckians."

A part of the UK College of Agriculture, Food and Environment, the UKVDL has a mission to develop and apply state-of-the-art diagnostic methodology to improve animal health and marketability, to protect the public health, and to assist in the preservation of the human-animal bond through the principles of One Health. **UK**

>Aimee Nielson is an agriculture communication specialist in the UK College of Agriculture, Food and Environment.



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Uneeda Bryant, DVM, was recognized for her continued efforts to encourage young people to enter science-related fields.

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<sup>\*</sup>Currently, there are no vaccines available with USDA-licensed label claims against equine abortions, uveitis or acute renal failure due to *L. pomona*.

<sup>1</sup> Data on file, Study Report No. B850R-US-12-011, Zoetis LLC.

<sup>2</sup> Data on file, Study Report No. B951R-US-13-043, Zoetis LLC.

<sup>3</sup> Data on file, Study Report No. B951R-US-13-046, Zoetis LLC.

<sup>4</sup> Data on file, Study Report No. B951R-US-15-092, Zoetis LLC.

# AHP Launches Fourth Equine Industry Survey

On Jan. 22 American Horse Publications (AHP) launched its fourth Equine Industry Survey.

Horse owners who live in the United States, are 18 and older, and who currently own or manage at least one horse are invited to complete the survey at [ahphorsesurvey.com](http://ahphorsesurvey.com) by April 1.

Conducted every three years, this project will help gauge participation trends and management practices in the U.S. equine industry, identify critical issues facing the equine industry as perceived by those who own or manage horses, and better understand horse health issues.

The online survey is made possible by a sponsorship from Zoetis, which has sponsored the survey since its inception in 2009.

"We are proud to once again sponsor the AHP Equine Industry Survey," said Sally Amtmann, senior equine marketing manager for Zoetis. "We hope that the survey will continue to help identify successes and opportunities for improvement in the equine industry that horse owners, veterinarians and professionals can unite to resolve."

Christine W. Brune, AHP executive director, added, "AHP is grateful for its partnership with Zoetis to provide



ongoing and vital data on the trends in horse care, management, and welfare of horses in the U.S. We appreciate the cooperation of our members and the industry in promoting this survey and will strive to maintain or exceed responses in 2018."

The study is anonymous; this means no one—not even members of the research team—will be able to associate information that is given with respondents. When the survey results are tallied, only aggregated results will be presented.

The survey sponsor and AHP members that promote the survey will receive complete results of the 2018 survey to release through their own

channels up to 60 days prior to release of the survey results to the AHP membership. Equine industry members can request a summary of this new information by contacting the AHP office at [ahorsepubs@aol.com](mailto:ahorsepubs@aol.com) after Sept. 15.

Horse owners and enthusiasts are invited to promote the survey by sharing this link with horse-owner groups, and individual horse owners.

C. Jill Stowe, PhD, an associate professor in the UK Department of Agricultural Economics, will provide consulting services for data collection and analysis to the AHP. **UK**

>Edited American Horse Publications press release.

## COMMENTARY

### 25 Years of Lloyd's Equine Disease Quarterly

"The more things change, the more they remain the same."

The epigram was written by Alphonse Karr during his tenure as editor of the French satirical magazine *Le Figaro* during the middle years of the 19th century. The intended meaning has been the subject of debate over the years, but placed in the context of international

equine health reporting, Karr's musing on change and permanence is a perfect fit for the *Equine Disease Quarterly* (EDQ).

EDQ was established in October 1992 as a collaboration between the University of Kentucky's Department of Veterinary Science, insurance giant Lloyd's of London, and local Lloyd's



agents. Its purpose, according to EDQ's first commentary, was to provide accurate information on equine diseases at three levels:

in Kentucky, in the United States, and internationally.

Twenty-five years and 100 issues later, despite groundbreaking changes in technology, a global recession, and the emergence of new diseases and threats from

old ones, the dedication to EDQ's original goal never has wavered. The publication is, as it always has been, a primary source of accurate and unbiased information for the international equine community. However, 25 years have seen significant changes. In 1992, the Dow Jones Industrial Average was 3,300. A first-class stamp cost 29 cents. People paid \$2,300 for a laptop computer (\$4,000 adjusted for inflation). The leading Thoroughbred sire was Danzig.

The first edition of EDQ had a mailing of 2,000. Now

## Lloyd's EDQ

more than 14,000 copies are mailed to individuals in 100 countries and the publication is translated into Japanese. Unlike most commercial, copyrighted equine publications, articles in *EDQ* can be reprinted in their entirety with proper acknowledgement. This "secondary" distribution of *EDQ* information has included veterinary clinic newsletters, equine industry publications, and vast distribution online.

In the 1992 inaugural

edition the International Collating Report covered four diseases in 59 words of copy: influenza, contagious equine metritis, strangles, and equine herpesvirus-1 abortions. In the October 2017 edition, the International Collating Report included reports of 24 different diseases and occupied a full page of text.

Sincere thanks goes to everyone associated with Lloyd's of London for continued financial support of this unique publication. Thank you to the cadre of editors, graphic designers, and

University of Kentucky staff who work diligently to produce a quality publication. To the authors of articles, thank you for your time and effort in condensing complex concepts and data into meaningful, practical information of 700 words or less for the benefit of the horse industry and without a stipend.

Much has changed in the world and the horse industry in a quarter century. *Equine Disease Quarterly* remains free to anyone upon request by print or e-mail, and all past editions are available

online at [gluck.ca.uky.edu/equinedisease-quarterly](http://gluck.ca.uky.edu/equinedisease-quarterly). They serve as a source of historical information on many disease conditions.

And, in closing, thank you to the readers who provide valuable feedback and commentary of your own.

CONTACT: Roberta M. Dwyer, DVM, MS, Dipl. ACVPM—[rmdwyer@uky.edu](mailto:rmdwyer@uky.edu)—859/218-1122—UK Department of Animal and Food Sciences **UK**

>Reprinted from *Lloyd's Equine Disease Quarterly*, January 2018, Volume 27, Number 1.

## Mineral of the Month: ZINC

Although the trace mineral zinc (Zn) was first noted as a new metal around 1374 in India, it had been used for many years prior, extracted in an impure form from zinc-ores to produce brass. Yet, it was not named until the 16th century, when a European alchemist documented it as "zinken."

The development of a method to purify these zinc extracts led to its use in the medical field, especially for treating inflammatory eye conditions by means of zinc solutions and tablets. Interestingly, researchers know today that the highest concentrations of zinc in the body can be found in the eye's choroid and iris.

It was only in 1934 that zinc was demonstrated to be an essential nutrient in rats' diets by Todd et al. Rats fed a low-zinc diet had poor growth rates and abnormal fur coats. The following year, research from the same laboratory showed that supplementing zinc-deficient rats with the mineral corrected the "faded, thin, and wooly" fur condition and allowed normal growth rates to resume. These findings were followed by similar research in livestock, exploring zinc deficiencies and establishing requirements. Across species, including in horses, reduced growth rates, inappetence, and skin abnormalities were common observations in zinc-deficient animals.

Today, research across species, including humans, has linked zinc to many bodily processes. These include fetal development, growth, tissue repair, reproduction, and the



KEVIN THOMPSON/THE HORSE

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immune system, to name but a few. Zinc serves as a catalyst for more than 200 metalloenzymes in the body, explaining in part how it can affect such a range of processes.

Zinc also fulfills many structural functions. For example, it can be found at the functional site of the enzyme copper/Zn superoxide dismutase and in a diverse group of proteins called zinc fingers, where a zinc ion stabilizes protein structures involved in functions such as signal transduction and cell proliferation. Zinc has also been shown to affect gene expression regulation.

In areas where soil zinc concentrations are low or marginal, local forages and feeds might subsequently be low in zinc. Feedstuffs commonly fed to horses contain approximately 15 to 40 milligrams (mg) zinc per kilogram (kg) of dry matter. The

recommended total dietary zinc intake for a 500-kilogram (1,100-pound) mature horse, idle or used for light exercise, is 400 mg per day (National Research Council's *Nutrient Requirements of Horses*, 2007). This recommendation increases to 500 mg per day for a lactating mare or heavily exercising horse of similar weight. Therefore, some horses might require additional zinc supplementation to meet their requirements.

Commercial horse feeds are formulated to provide additional zinc to a horse's diet and could contain either an organic or inorganic form of zinc, as would be indicated on the feed tag. The maximum tolerable concentration for zinc in equine diets has been set at 500 mg/kg dry matter, well above the recommended amount of zinc required by the horse. However, excessive amounts of dietary zinc could interfere with a horse's copper status. It is not clear if zinc affects copper metabolism by interfering with absorption through shared transport mechanisms, or post-absorption, but maintaining a reasonable total dietary copper-to-zinc ratio is important. Commercial horse feeds are formulated keeping this in mind. Therefore, it is always a good idea to work with a nutritionist should you consider adding mineral supplements to a balanced commercial horse feed. **UK**

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

## Dr. Gene Lyons Memorial Reception



More than 90 attendees gathered at a memorial reception on Jan. 19 at the UK Hilary J. Boone Center to remember Eugene Lyons, PhD, a longtime UK Department of Veterinary Science faculty member who died Dec. 7, 2017. He was 86. Pictured, Peter Timoney, MVB, MS, PhD, FRCVS, a professor at the Gluck Center, shares memories of Lyons with the crowd.

## WATCH NOW: Fair Horse Handling



Clarifying learning theory terminology in order to enhance "fair" horse training & Utilizing learning theory in everyday situations

Camie Heleski, Ph.D.  
(camie.heleski@uky.edu)

Research Interests: Horse Behavior & Welfare; Horse-Human Interaction; Working Equids in Developing Parts of the World

As part of the 2017 UK Equine Diagnostic and Research Seminar Series, Camie Heleski, MS, PhD, an instructor and adviser in the UK equine science and management program, presented a lecture on learning theory to help horse people and vets more safely and humanely interact with horses.

Watch her presentation in full at [TheHorse.com/40089](http://TheHorse.com/40089)

## Upcoming Events

### Feb. 2-3

UK Equine Showcase and Kentucky Breeders' Short Course, Fayette County Extension Office  
Register at [2018ukshowcaseshortcourse.eventbrite.com](http://2018ukshowcaseshortcourse.eventbrite.com).

### Feb. 22, 4-5 p.m.

UK Department of Veterinary Science Equine Diagnostic and Research Seminar Series  
Topic: Parasitology  
Speaker: Martin Nielsen, DVM, PhD, Dipl. EVPC, ACVM  
Location: UKVDL

## Stay Socially Connected to UK Ag Equine Programs

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

Follow us on Twitter:

**UK Ag Equine Programs:**

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

**UK Maxwell H. Gluck Equine Research Center:**

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

**UK Veterinary Diagnostic Laboratory:**

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

Prefer Facebook? Like these pages we administer:

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

**UK Equine Alumni** A community established for the alumni of UK's equine programs, including ESMA, graduate students, and club and team members.

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

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

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

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

