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Researching and Developing Novel Fecal Egg Count Methods

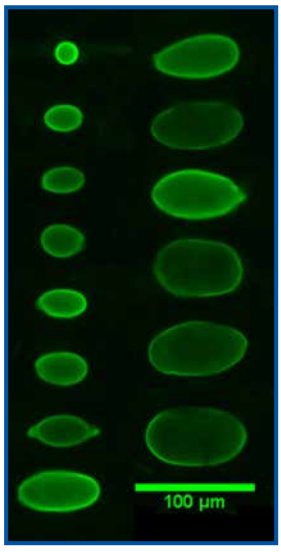
Paul Slusarewicz, PhD, adjunct professor at the University of Kentucky Gluck Equine Research Center and co-founder and chief scientific officer at MEP Equine Solutions LLC, is developing a method to rapidly detect and count the number of parasite eggs in feces. Slusarewicz, who began this work as a visiting scholar at UK, has been collaborating with and working in the lab of Martin Nielsen, DVM, PhD, Dipl. EVPC, ACVM, assistant professor in the Gluck Center's Department of Veterinary Science.

Slusarewicz's previous CEO at a different company, local businessman Eric Hauck, introduced him to Nielsen, and the three co-founded MEP Equine Solutions LLC to research, develop, and commercialize the technology behind the Parasight System, which allows the user to perform fecal egg diagnostics using a smartphone.

Jessica Scare, a PhD candidate in Nielsen's lab, assisted with early validation work. Stefanie Pagano, a master's student of biomedical engineering at UK, and Chris Mills, a senior in biosystems engineering at UK, also helped in the lab. As part of a UK-wide effort, the egg-binding protein that is central to the technology behind the Parasight System was produced by Professors Mike Mendenhall, PhD, and David Rodgers, PhD, at Protein Core in the UK Center for Molecular Medicine.

Slusarewicz is a biochemist with experience in pharmaceuticals, biologics, and medical devices. He began his work in the equine field when he was able to transfer his work with proteins in humans to heal tendons in equids.

The idea for an easier method of fecal egg counting came in March 2014. He began work in Nielsen's lab in June 2014 after Hauck raised research money from investors. Using the product involves taking a fecal sample, treating it with various chemicals that make the eggs glow green when illuminated with blue light, and then using an iPhone to photograph and count the parasite eggs. The whole process takes less than five minutes. This technology also allows the user to identify eggs of different parasite classes, such as ascarids and strongyles, in horses.



A microscope image of a wide variety of parasite eggs and oocysts from a single cow sample stained using the dye Dr. Slusarewicz developed at the Gluck Center.

The Parasight System was developed to be simple, precise, and useable both in the field and in any veterinary practice. It is an alternative to the current McMaster and Stoll egg counting methods, which require a lab and lab technician to perform microscopy and visually count each individual egg, recording it with a clicker. The product prototype received an overwhelming positive response at the 2014 American Association of Equine Practitioners Annual Convention, held Dec. 6-10, in Salt Lake City, Utah.

"If you make the process easier, people will use it," said Slusarewicz.

Slusarewicz's work will impact the equine industry by changing how owners and veterinarians treat equids for parasites. Knowing precisely what parasites to target and even whether deworming is necessary at all will lead to more effective treatment. This means less drug resistance in parasites and fewer chemicals put into horses. He also highlighted that this technology is not limited to horses; it can be used to detect parasites in many species,

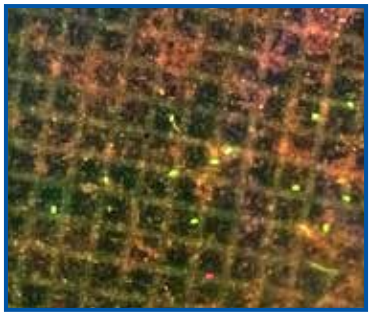
The Parasight System's prototype imaging device.

Articles of Interest

Fecal Egg Count Methods

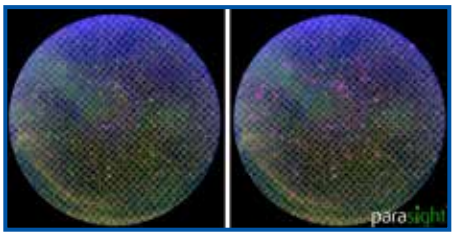
including cows, sheep, goats, and household pets.

Slusarewicz said there are several directions in which he would like to continue research and development. The current project focuses on creating an ambulatory product, but developing a sophisticated desktop system with a better camera that can discriminate a wider variety of eggs and designing an automated system for use by a commercial mail-in service are other ways people could this technology.



Fluorescing equine strongyle eggs stained by the Parasight System and photographed using an iPhone 5s attached to the Parasight System's imaging device.

Looking further ahead, Slusarewicz has ideas about how to develop a test using color change in a tube, so animal owners can track treatment progress themselves. Also, the ability to identify antigens on the eggs of particularly pathogenic parasite species, which would allow antigen detection in animals, is another area for development.



The Parasight System's app in action. An image captured using an iPhone on the imaging unit before and after counting by the Parasight System's iPhone app.

"I envision a more sensible and precise method for fecal egg counting that is more convenient for veterinarians and animal owners," said Slusarewicz. "With this method, a microscope will no longer be needed, and the identification of eggs will not depend on the subjectivity of the person performing the test. This will all make it easy for everyone to do the right thing, by testing instead of treating prophylactically, and so prevent the ever-growing problem of parasite drug resistance."

At this time, Slusarewicz and his team are working hard toward commercialization and expect that the product will be available to equine veterinarians in less than a year. The Parasight System was recently given an outstanding rating and awarded a $100,000 Small Business Innovation Research grant by the USDA. For more information, visit theparasightsystem.com/technology. UK

>Hannah Forte is a communications intern with the UK Ag Equine Programs and Gluck Equine Research Center and undergraduate student majoring in community and leadership development at UK.

For more information, see "The Parasight System Introduces Revolutionary Mobile Medical App to Detect Parasites."

Cobalt Use in Racehorses

This past year, horse racing regulators worldwide have turned their attention to a seemingly innocuous substance: cobalt. Every horse needs this important element to survive, but some horsemen believe that supplementing the substance will help their horses gain a competitive advantage on the racetrack.

At the 2015 UK Equine Showcase, held Jan. 23 in Lexington, Kentucky, Cynthia Gaskill, DVM, PhD, Dip. ABVT, reviewed cobalt, its use in racehorses, and recent research on the topic. Gaskill is a veterinary toxicologist at the UK Veterinary Diagnostic Laboratory, also in Lexington.

Cobalt is a trace mineral found in B vitamins that horses require in tiny amounts for correct physiological functioning. As a result, all horses have trace amounts of the substance in their systems.

MASTHEAD

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Cobalt Use in Racehorses

Gaskill explained that doctors used cobalt to treat anemia (essentially by increasing the blood's oxygen-carrying capacity) in humans for decades. However, it was associated with a variety of adverse effects, including gastrointestinal, neurologic, cardiovascular, and thyroid problems. As a result, doctors have largely ceased using it. Some athletes, however, continue using it as a doping agent, she said.

Until recently, she added, researchers had not evaluated cobalt supplementation's effects in horses. Because racing regulators' interest in the element has increased, however, the amount of research into it has, as well.

In 2014, Gaskill said, Heather Knych, DVM, PhD, of the University of California, Davis, and colleagues evaluated how cobalt distributes and works within horses' bodies following a single intravenous dose comparable to what's reportedly used on the racetrack. Some key findings included:

- Horses' baseline serum cobalt levels were less than 1 part per billion (ppb), which is extremely low, Gaskill said;
- Peak serum concentrations following cobalt administration were extremely high, she said;
- The substance's half-life (the time required for the drug's concentration in the blood to decrease by 50%) was about six-and-a-half days, which is longer than previous studies suggested, Gaskill noted—this is beneficial to know for drug testing purposes;
- Serum concentrations 10 days following administration were still elevated—about 20 to 50 ppb—which is also good for testing purposes; and
- The team found that administration had no effects on horses' erythropoietin levels or red blood cell counts (both of which could improve oxygen-carrying capacity and, thus, performance) or any adverse effects at the administered dose.

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Studies are underway to better understand cobalt's impact on racehorses.

Also in 2014, Emmie N. M. Ho, PhD, a racing chemist at the Hong Kong Jockey Club's Racing Laboratory, in China, worked with colleagues on developing cobalt testing thresholds. Gaskill said the research team proposed a threshold of 2 ppb on race day and 10 ppb for out-of-competition testing. She noted that laboratories in Hong Kong use a different testing method than U.S. labs use, which detects much smaller concentrations, resulting in a lower threshold.

Last October, Indiana set a race-day cobalt threshold of 25 ppb for horses in that state. Gaskill said that prior to the threshold's implementation, 6 to 7% of horses tested had increased cobalt levels. Since implementation, less than 1% of horses tested have had increased cobalt levels. Kentucky is currently conducting cobalt surveillance.

Following Gaskill's presentation, in March, the Racing Medication and Testing Consortium recommended the following cobalt thresholds:

- Horses that test above 25 ppb in plasma shall be placed on the veterinarian's list and are ineligible to race until they test below 25 ppb of cobalt in plasma, and the horses' connections shall be subject to a fine or a warning for the first offense; and
- Horses that test above 50 ppb in plasma shall be subject to a Class B penalty, which in most jurisdictions includes disqualification of the horse, a fine, and trainer suspension.

Gaskill said several additional studies evaluating cobalt's adverse effects, the administration of cobalt-containing supplements, and blood samples from non-racing Standardbreds are in progress. She also said there's work underway in which researchers are evaluating the different cobalt testing methods.

In closing, Gaskill stressed that while illicit cobalt use appears to be prevalent, its effects—negative or positive—aren't currently well-understood: "No one has documented any beneficial effects scientifically yet in horses." UK

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

UK Lecture Series Presents Conversation With Leading Reiner Shawn Flarida

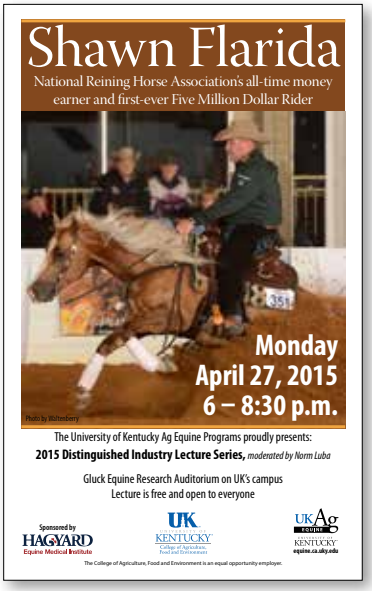
Shawn Flarida, National Reining Horse Association's leading rider, all-time money earner, and member of the National Reining Horse Association (NRHA) Hall of Fame, will speak at the UK Ag Equine Programs' next Distinguished Industry Lecture Series at 6 p.m. EDT on April 27 in the Gluck Equine Research Center's auditorium on the UK campus. Sponsored by Hagyard Equine Medical Institute, the event is free and open to the public.

"We are excited to offer this opportunity to our students," said Jill Stowe, PhD, director of UK Ag Equine Programs, part of the College of Agriculture, Food, and Environment. "It's a real privilege to be able to learn from one of the most decorated reiners ever and a top-notch horseman to boot. Plus, we are excited to expand the breadth of the lecture series by hosting our first guest representing Western riding disciplines."

Flarida is the first-ever Five Million Dollar Rider. He has five NRHA open futurity championships to his name and has won the All-American Quarter Horse Congress futurity 11 times.

Additionally, he was an individual and team gold medal winner at the 2002 World Equestrian Games in Jerez, Spain, riding for Team USA. In 2010 he was the high scoring rider in the World Equestrian Games team competition and led Team USA to the gold medal.

"How I feel about this opportunity to showcase the sport of reining to our



Shawn Flarida

students and my fellow Western horse enthusiast is beyond words," said Bob Coleman, PhD, director of undergraduate studies in equine science and management and current Kentucky Quarter Horse Association president. "If you want to feel the hair on your neck rise, come and see what this world-class athlete has done and learn more about those folks who ride and slide. It will be worth every minute."

Flarida knew from a very early age what he wanted to do when he grew up. In 1988 he graduated from high school and went to work for his brother, Mike Flarida, who had an established and successful business as a reining trainer. In 1989 Flarida branched out on his own.

Notoriously superstitious—always showing in a green shirt—Flarida's stated focus is on working hard at home and being the best horseman he can be. His website is thegreenshirt.com.

"On behalf of the college, we welcome Mr. Flarida to a line of superstars who have given time to our program through this special lecture series," said Dean Nancy Cox, PhD. "UK Ag Equine Programs is lucky to be located in the horse capital of the world, where both equestrian and equine luminaries come to show and race. The college is dedicated to this industry and appreciates the sponsorship of Hagyard Equine Medical Institute for making this event possible."

The Distinguished Lecture Series began in the fall of 2009 and has become a signature event of UK Ag Equine Programs. It is designed to showcase important figures from the equine industry in an informal setting.

Previous series speakers included Keeneland's Nick Nicholson, accomplished equestrienne Nina Bonnie, Keeneland's Ted Bassett, Zenyatta owners Jerry and Ann Moss, Olympian Reed Kessler, and a doubleheader featuring both Thoroughbred trainer Graham Motion and three-day eventer Buck Davidson. UK

>Holly Wiemers, MA, APR, is the communications director of UK Ag Equine Programs.

STUDENT SPOTLIGHT

MACARENA SANZ

From: **Argentina**

Degrees:

DVM from La Plata National University;
Master of Science and Dipl. ACVIM at Washington State University;
PhD at the University of Kentucky Maxwell H. Gluck Equine Research Center

Macarena Sanz, DVM, PhD, Dipl. ACVIM, came to UK's Maxwell H. Gluck Equine Research Center for her doctoral research in equine immunology and infectious diseases, which she completed in fall 2014, because of the distinguished program. In particular, she sought to work under David Horohov, PhD, interim chair of the Department of Veterinary Science at UK, interim director of the Gluck Equine Research Center, and Jes E. and Clementine M. Schlaikjer Endowed Chair at the Gluck Center, because of his worldwide recognition as a specialist in equine immunology. For the past several months after earning her doctoral degree, she has been a postdoctoral scholar at the Gluck Center where she continues her research.

The purpose of her primary research is to identify factors that affect foal susceptibility to *Rhodococcus equi*, a microorganism that causes pneumonia in young foals. There is currently a lack of knowledge about *R. equi* pneumonia because historically researchers have not had an appropriate experimental model to reproduce it.

"We have developed a neonatal foal model that mimics the outcome of natural infection," Sanz said. "This model allows us to generate important information that improves the understanding of the relationship between foal age and susceptibility, and the neonatal foal immune response to the organism."

The information gathered using this model is vital to develop preventive strategies. Currently, there is no vaccine against this endemic disease and no way to make an early diagnosis in foals that will develop clinical pneumonia. There are also few current treatment options for *R. equi* pneumonia. These include routine ultrasonography to detect possible cases, coupled with antimicrobial treatment of any foal with pulmonary lesions, or antimicrobial treatment of all foals in the first three weeks of age.

"There has been an increase in antimicrobial resistance in the field, which is not only a veterinary concern but also a human concern, as *Rhodococcus equi* infects immunosuppressed people (such as those with AIDS or organ transplants)," Sanz said.

Sanz was also able to assist Amanda Adams, PhD, an assistant research professor at the Gluck Center, with research projects on geriatric horses and metabolic diseases. Sanz said she has learned about the importance of collaborative work and understanding the needs of the industry in her time at the Gluck Center. After her postdoctoral scholar appointment, Sanz will join the equine faculty at Washington State University to continue her research in equine immunology and infectious disease. UK

>Hannah Forte is a communications intern with the UK Ag Equine Programs and Gluck Equine Research Center and undergraduate student majoring in community and leadership development at UK.

Kentucky Equine Market Continues to Show Improvement

Horses have been one of the signature sectors of Kentucky's agricultural economy for many years. Equine receipts were the top agricultural commodity in the Bluegrass State for several years following the tobacco buyout and are typically one of the major economic contributors. However, like most sectors of the economy, equine markets were heavily impacted by the recession.

Keeneland sales, a major driver of Kentucky equine receipts, fell by 53% from 2007 to 2010. Since that time period, equine markets have been largely in a state of recovery. Keeneland sales for 2014 were up by 40% from those reduced 2010 levels. Figure 1 shows the decrease

Kentucky Equine Market

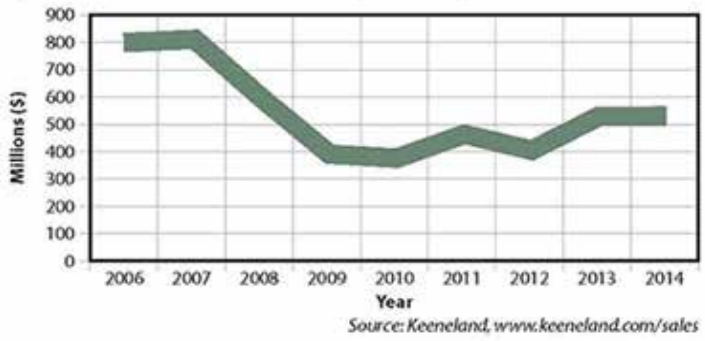
in sales levels from 2007 to 2010 and the rally through 2014.

In addition to sales, stud fees are also a significant revenue stream for the equine sector. Figure 2 shows an estimate of stud fee revenues in Kentucky based on the Kentucky Thoroughbred Breeder's Incentive Fund payouts. These estimates are likely conservative, because not all breeding activity is subject to sales taxes, such as the stallion and mare both having the same owner and the use of season shares and foal shares. However, the trend in revenues is likely a reasonable representation of the trend in breeding activity during this time period. According to Figure 2, stud fee revenues followed a similar pattern of weakness from 2007 to 2010, but have shown some improvement since then.

Stud fee revenues are based on two factors: the stud fee and the number of mares bred. The only definitive way to increase stud fee revenues is an improvement in both of those factors. While stud fees may have been trending upward in the past few years, according to the *2015 Kentucky Fact Book* produced by The Jockey Club Stud, the number of mares bred to Kentucky stallions reached a near-peak in 2008 and fell steadily afterwards, only showing its first upward trend in 2013.

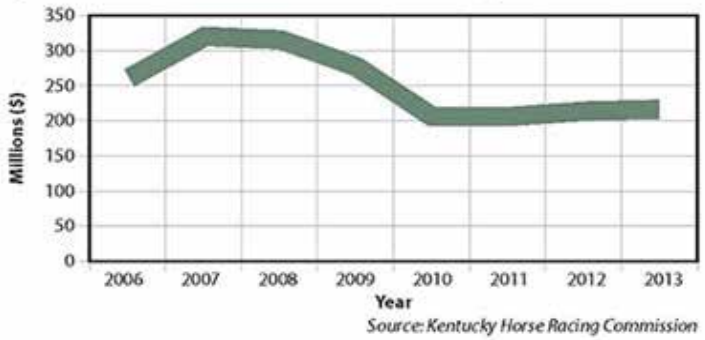
The fact that the improved sales levels of 2013 were sustained for 2014 was certainly a good sign for the equine markets last year and likely signals a significant recovery from the 2008 to 2010 time period. Improved sales also bode well for stud fees in the coming years, which have not seen the level of improvement that sales have. Widespread improvement in the equine markets would be welcome news in Kentucky, where equine typically accounts for a significant portion of the state's agricultural cash receipts and has significant secondary and tertiary effects on the state's economy. UK

Figure 1. Annual Keeneland sales totals (2006-2014).



Source: Keeneland, www.keeneland.com/sales

Figure 2. Estimated revenue from stud fees in Kentucky (2006-2013).



Source: Kentucky Horse Racing Commission

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This is an excerpt from *Equine Disease Quarterly*, funded by underwriters at Lloyd's, London, brokers, and their Kentucky agents.

Gluck Equine Research Foundation Releases Sixth Research Report

The University of Kentucky Gluck Equine Research Foundation published its *2014 Research Report* in April of this year. The Research Report 2014 focuses on the UK Maxwell H. Gluck Equine Research Center faculty's research accomplishments and scientific publications during the 2014 calendar year.

The *Research Report* is divided into the seven sections (genetics and genomics, immunology, infectious diseases, musculoskeletal science, parasitology, pharmacology, therapeutics and toxicology, and reproductive health) and includes faculty members' educational backgrounds, interests, research projects, and graduate students. It also lists research technicians/assistants and visiting scientists in 2014.

The *Research Report* covers Gluck Equine Research Center awards and grants and scientific publications, including books/chapters in books and refereed journal articles.

The *Research Report* is available online at ca.uky.edu/gluck or at ca.uky.edu/equine. For more information contact Jenny Evans at jenny.evans@uky.edu or 859/218-1089. UK

>Jenny Evans, MFA, is the interim executive director of the Gluck Equine Research Foundation and marketing and promotion specialist senior at the Gluck Equine Research Center.

UK Equine Farm and Facilities Expo to be held June 2

University of Kentucky Ag Equine Programs will host its annual Equine Farm and Facilities Expo from 3:30 to 8 p.m. EDT on Tuesday, June 2 at McPeek Racing's Magdalena Farm in Lexington.

Horse owners and farm managers will have the opportunity to walk through a vendor trade show and see a range of equipment and supplies for horse farms of all sizes. Additionally, UK specialists will provide hands-on instruction about practical aspects of management for equine operations. There will also be farm tours.

"The expo provides horse owners the chance to attend an informative event on the grounds of a working

UK Expo

horse farm," said Ray Smith, PhD, forage extension specialist for the UK College of Agriculture, Food and Environment. "We appreciate Kenny McPeek for hosting this event and for opening the farm's gates to the public."

Nick Carter, Fayette County agriculture and natural resources extension agent, said the expo is a unique opportunity for horse owners to learn about a wide range of topics.

"There are not many other venues around that allow horse owners this kind of opportunity," he said.

Experts from UK will lead demonstrations on subjects including footing, pasture weed management, and landscape decisions on horse farms. In addition, McPeek will share with attendees what he looks for in a Thoroughbred yearling. There will also be a number of informational booths staffed by UK specialists.

McPeek Racing specializes in selection, management, and training of Thoroughbred racehorses. McPeek serves on the board of UK Ag Equine Programs and has been training racehorses since 1985. The farm is located at 2651 Russell Cave Road in Lexington.

Admission to the expo is free, and a meal will be provided. Reservations are appreciated. Contact the Fayette County Extension office at 859/257-5582 to reserve a spot.

For more information about this and other UK Ag Equine Programs events, visit http://www.ca.uky.edu/equine or email equine@uky.edu.

>Holly Wiemers, MA, APR, is communications director for UK Ag Equine Programs.

UK Ag Equine Programs Celebrates 10 years

Nearly 50 UK students will accept their degrees in Equine Science and Management May 9, but many are likely unaware of how new their degree program is and what a momentous occasion its creation was for the college.

This spring marks 10 years since the College of Agriculture, Food, and Environment launched UK Ag Equine Programs, then called the Equine Initiative.

"The program is ideally situated in the heart of horse country, and this provides opportunities for researchers, extension agents, and students to leave their footprint in the industry at the local, national, and international levels," said Jill Stowe, PhD, director of UK Ag Equine Programs.

The college set out to radically change how it served Kentucky's signature equine industry when it launched the UK Equine Initiative in 2005 to provide a suite of services appropriate for a land grant university. At the time, the college housed the Department of Veterinary Science's Gluck Equine Research Center and Veterinary Diagnostic Laboratory and two equine faculty members in the Department of Animal and Food Sciences. While there was equine research, extension, and teaching work already being done in the college, there was no undergraduate standalone equine major and few horse-tailored extension programs. There was also no real "front door" for the general public to access UK's equine expertise.

Much has been accomplished in the last 10 years. The program is distinctive with its strong focus on all three land-grant university missions of teaching, research, and extension.

"Thanks to a lot of dedicated and passionate faculty, staff, and stakeholders, UK Ag Equine Programs has surpassed the original vision," said Dean Nancy Cox, PhD. "In fact, it is not often that a university program has such rapid success in terms of excellent education, service, and relevancy. This program belongs to the horse capital of the world, and we aim to serve the industry for a long time."

A distinct equine undergraduate bachelor of science degree has been in place since the fall of 2007 and has swelled from an initial class of 42 students to 267 students currently in the program, making it the second largest major in the college. There have been 135 graduates to date. Nearly 70% of the current equine majors hail from out of state.

The undergraduate program started with tracks in science and management, and has since evolved to four emphasis areas: equine science, business, com-

UK Ag Equine Programs Celebrates 10 Years

munity and leadership development, and forages/pasture management. Completion of an internship is a requirement for graduation.

Additionally, seven clubs and teams are available for students to pursue their equine interests outside the classroom. Those organizations include the Dressage and Eventing Team, Equestrian Team with both hunt seat and Western divisions, Horse Racing Club, Polo Team, Research in Equine and Agricultural Disciplines Club, a fledgling Rodeo Team, and the Saddle Seat Team.

In addition to its burgeoning undergraduate program, the College of Agriculture, Food, and Environment also offers targeted graduate school opportunities and is home to world-class research and service excellence in equine nutrition, pasture and forages, economics, environmental stewardship, and many other areas.

The Gluck Equine Research Center has a storied history of important equine health research and currently focuses its research in the areas of genetics and genomics, infectious diseases and immunology, musculoskeletal science, parasitology, pharmacology/toxicology, and reproductive health.

The vast majority of horses raised in Kentucky use pasture as an important nutrient source, and UK researchers are developing nutrition and pasture management practices to improve the knowledge of optimal equine feeding programs and production schemes. Equine researchers at UK have also increased their efforts in understanding the role of nutrition and feeding management on the health, growth, and longevity of horses in recent years.

From left to right, UK College of Agriculture Dean Nancy Cox, alumnus Gus Koch and current undergraduate Sarah Sivinski, give remarks at a celebration event March 27 marking the program's last 10 years.

Left, UK Provost Tim Tracy and College of Agriculture, Food and Environment Dean Nancy Cox look over a photo book created to commemorate the 10th anniversary of UK Ag Equine Programs.

UK Ag Equine Programs current director, Jill Stowe, PhD, is joined left to right by past directors Jamie MacLeod, PhD, and Ed Squires, PhD.

The 2012 Kentucky Equine Survey, a comprehensive statewide survey of all breeds of horses, ponies, donkeys, and mules—the first such study in Kentucky since 1977—was conducted from June to October 2012 in cooperation with the USDA and in partnership with several Kentucky industry organizations. The survey found that Kentucky is home to 242,400 horses with a total economic impact of almost $3 billion. The survey is available at http://www2.ca.uky.edu/equine/kyequinesurvey.

UK also has a long history of exceptional equine service and outreach.

The Veterinary Diagnostic Laboratory, one of the busiest state diagnostic laboratories in North America with more than 53,000 case submissions each year, serves as sentinel for animal and human health and has the largest equine caseload in the world.

The Kentucky 4-H Horse Program is one of the largest in the nation, with enrollment of more than 4,500 youth.

The Horse Pasture Evaluation Program identifies the composition of Kentucky horse pastures, assesses tall fescue toxicity risks, and encourages better pasture management practices. To date, the program has completed more than 120 evaluations on over 18,000 total farm acres.

Education for horse owners also occurs through annual field days, Horse College, a horse grazing program, HorseQuest, and eXtension. Additionally, several publications by experts offer hands-on horse management information.

More about UK Ag Equine Programs can be found at http://www.ca.uky.edu/equine. UK

>Holly Wiemers, MA, APR, is communications director for UK Ag Equine Programs.

Water Hardness Worries

Q My local water company has recently announced that our new community water source (underground wells) is "hard" water with higher levels of calcium and magnesium than were in our previous water. At a public meeting this week, one of the residents complained that her horses are acting "differently" since the introduction of the new water. My horses seem to be drinking a little more than they did previously, but it's winter and they are on hay since the pasture has died back in the cold. I feed a 14% protein/6% fat pelleted local feed, free-choice mixed-grass hay, and free-choice grass pasture. The horses have free-choice white salt and mineral blocks.

Do I need to worry about the change in water or the additional source of calcium in their diets?

Liz, Nashville, Tennessee

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Continued on page 8

Water Hardness Worries

A "Hardness" is term that is often associated with the amount of calcium (Ca) and magnesium (Mg) in water. In many cases the calcium and magnesium in water sources are associated with the geology of a particular area, so water from one region might be naturally higher in calcium and magnesium (and, thus, "harder") than another region. Calcium and magnesium can be removed from water using a water softener. Many people choose to use a water softener to reduce the hardness of their water because they believe that softened water cleans better and leaves less residue on dishes or on fixtures.

In this case it appears that a municipality has either changed water sources or, perhaps, has reduced the amount of "softening" that is performed on the water. You have inquired whether the increased hardness could be a problem for her horses. The first concern with a change in water source is whether the horses discriminate against it and reduce water consumption. If you did not observe a decrease in water intake, then that concern is minimized.

The next concern could relate to the amount of calcium and magnesium that horses could be consuming from the water. The water company has said that the water is harder; but without a water analysis it is difficult to know exactly what that means ... a little bit harder or a lot harder? Some of the references I found indicated that "hard" water could contain as much as 35 mg of Mg per liter of water or as much as 60 mg of Ca per liter of water. Depending on the season of the year and the amount of moisture in other feeds, an idle 1,000-pound mature horse will drink 20 to 50 liters of water a day. At the highest intake rate (50 L) this "hard" water would provide 3 grams of Ca and 1.75 grams of Mg per day. Is that a large amount? Just 22 pounds of an average timothy hay will provide about 30 grams of Ca and 20 grams of Mg per day. So, the contribution from the water is very small, even in this example, which would use fairly hard water. If the change in hardness is small, then the amount of Ca and Mg contributed by water would be smaller.

I found this to be an interesting question because some horsemen prefer nonsoftened water for their horses, believing that the minerals in the water are beneficial. There is no evidence for this that I know of, but there is also no evidence that I know of that contradicts that opinion either. It may be important for horse owners to understand whether the increased hardness originates from using a new source or if it is due to a change in the water treatment process. In many cases water is softened using an ion exchange process, which sounds complicated but just means that the process exchanges Ca and Mg ions for sodium ions. So, softened water could be higher in sodium that unsoftened water. If horses have access to a salt block, then a lower sodium content in the new water is likely not an issue.

Finally, water hardness is just one part of water quality. It does not estimate other minerals, compounds, or organisms that might be in the water. UK

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UPCOMING EVENTS

April 27

Distinguished Lecture Series: Shawn Flarida, 6 p.m. registration, Gluck Equine Research Center Auditorium

June 2

Equine Farm and Facility Expo, 4-8 p.m., McPeek Racing Farm

[1] Data on file, sales report data from 2001 through October 2012, Zoetis Inc.