

## Study Shows Kentucky's Equine Industry has \$3 Billion Economic Impact

**K**entucky's equine industry had a total economic impact of almost \$3 billion and generated 40,665 jobs last year, according to the 2012 Kentucky Equine Survey. The equine industry's tax contribution to Kentucky was approximately \$134 million.

According to project lead Jill Stowe, PhD, an associate professor in agricultural economics and University of Kentucky Ag Equine Programs director, the total economic impact is measured by the output effect and is an estimate of revenues earned by the sale of goods and services related to the equine industry and its interconnected industries. The study also showed that the value-added effect, which is perhaps a more descriptive measure of economic impact because it accounts for costs of production, has an estimated economic impact of \$1.4 billion. The value-added effect is a measure of profitability and new income paid to workers rather than simply revenue.

On Sept. 6, the UK College of Agriculture, Food and Environment's Ag Equine Programs and Kentucky Horse Council, in conjunction with the U.S. Department of Agriculture National Agricultural Statistics Service, released the economic impact figures from the 2012 Kentucky Equine Survey, a comprehensive statewide survey of all breeds of horses, ponies, donkeys, and mules. This was the first such wide-ranging study of Kentucky's equine industry since 1977 and the first-ever detailed economic impact study about Kentucky's equine industry.

"We are pleased to announce the long-awaited results from the economic impact study," said Stowe. "The estimates underscore the continued significance of the equine industry to the commonwealth, and they show that

each segment of the industry contributes in important ways to the economy as well as to the rich cultural fabric of Kentucky."

When looking more specifically at each sector's estimated impact, breeding had the highest employment figure of 16,198, an output of \$710 million and a value-added impact of \$333 million. Racing had the highest output impact at \$1.28 billion, with an employment figure of 6,251 and \$601 million in value-added impact. Competition figures included 2,708 in employment, \$635 million in output, and \$297 million in value-added impact. Recreation had 594 in employment, \$166 million in output, and \$78 million in value-added impact. Other, which accounts for operations such as therapeutic riding facilities and those where horses are used for work, had an employment figure of 14,914, a \$194 million output, and a \$91 million value-added impact.

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Survey results showed that the equine breeding sector has the highest employment figure.

## Kentucky's Equine Industry

"The College of Agriculture, Food and Environment is proud of this project because first and foremost, it represents the best available methods of surveying that universities and government can provide," said Nancy Cox, MS, PhD, associate dean for research in UK's College of Agriculture, Food and Environment, Kentucky Agricultural Experiment Station director, and administrative leader for UK Ag Equine Programs. "But the most compelling aspect of this study is that our future policy discussions can be guided by solid numbers. We thank the Kentucky Horse Council and the Kentucky Agricultural Development Board, as well as our numerous donors, for recognizing how much the Horse Capital of the World needs a sound foundation for policy decisions."

The first phase of the study was released in January and measured Kentucky's equine and asset inventory. That portion of the study found that the state is home to 242,400 horses and estimated

the total value of Kentucky's equine and equine-related assets at \$23.4 billion. The survey's results identified 35,000 equine operations and 1.1 million acres devoted to equine use.

Also from the inventory portion of the study, the total of all equine-related sales and income for equine operations was about \$1.1 billion. That total came from sales of all equines, estimated to be \$521.1 million, and \$491 million in income from both breeding and nonbreeding services, such as training, lessons, boarding, farrier, transportation, purses, and incentives.

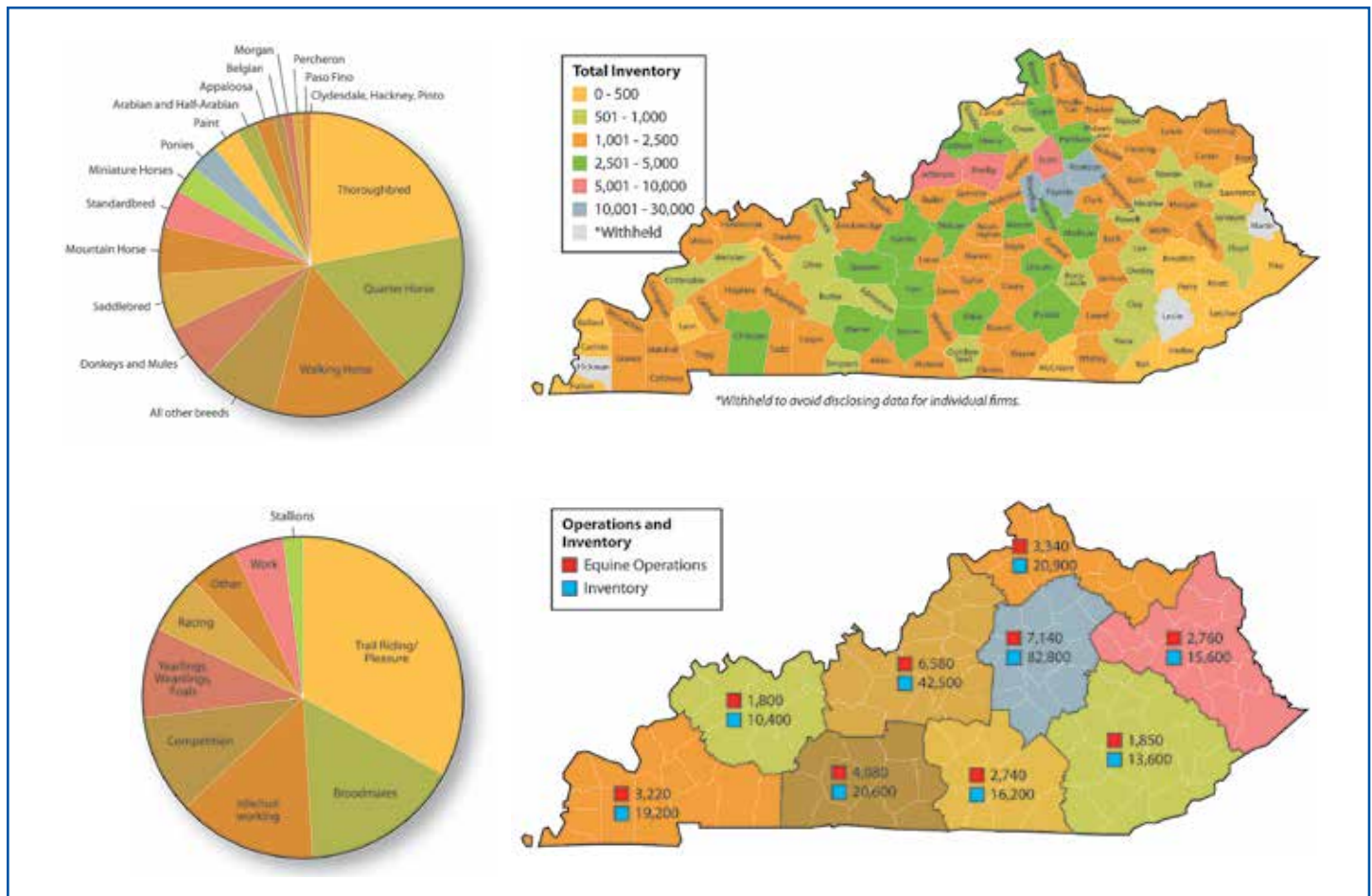
The first phase also found that equine-related expenditures by equine operations totaled about \$1.2 billion. Capital expenditures by equine operations, including the purchase of horses, real estate, and improvements and equipment, were estimated to be \$337 million. Operating expenditures, including expenses paid for boarding, feed, bedding, veterinary, supplies, farrier services, breeding, maintenance and repair, insurance premiums, utilities and fuel, taxes, rent and/or lease, fees and payments,

shipping and travel, training and other fees, totaled \$839 million. Notably, 77% of these operating expenses were spent in Kentucky.

The study determined that 56% of Kentucky's equine operations are farms or ranches, 30% are for personal use, 3% are boarding, training, or riding facilities, and 2% are breeding operations.

The vast majority of horses inventoried were light horses (216,300), followed by donkeys and mules (14,000), ponies (7,000), and draft horses (5,100). Thoroughbreds are the most numerous breed in the state (54,000), followed by Quarter Horses (42,000), Tennessee Walking Horses (36,000), American Saddlebreds (14,000), donkeys and mules (14,000), Mountain Horse breeds (12,500), Standardbreds (9,500), Miniature Horses (7,000), ponies (7,000), Paint Horses (6,500), and Arabian and Half-Arabian horses (5,500).

The primary use of the majority of Kentucky's equines is for trail riding/pleasure (79,500); followed by broodmares (38,000); idle/not working horses (33,000); competition/show (24,500);



## Kentucky's Equine Industry

young horses, including yearlings, weanlings, and foals (23,000); racing (15,000); work/transportation (12,500); breeding stallions (3,900); and other activities (13,000).

"The data from this study will benefit the state in many ways," said Anna Zinkhon, Kentucky Horse Council Board president. "We have already made use of the results at two regional horsemen's caucuses held in areas with identified concentrations of equine populations. We are looking forward to at least three additional regional horsemen's caucuses based on this data in 2014."

As might be expected, there is a large concentration of horses in the Bluegrass area of Central Kentucky but there are also other areas of the state with significant equine concentrations.

According to the report, the top 10 counties in Kentucky with equine acres were Fayette (89,000), Bourbon (48,700), Woodford (44,200), Scott (26,600), Grant (22,000), Oldham (21,000), Grayson (18,900), Warren (18,700), Boone (16,500), and Carter (16,400). More detailed county information can be found in the full report online.

"The University of Kentucky has equine expertise in many scientific disciplines," said Norman K. Luba, executive director of the North American Equine Ranching Information Council. "The economic survey is an example of expertise that transcends over not only the science of horses, but the business of horses in the commonwealth. Documented and dependable economic data will provide critical information about the significant role the horse industry plays in the economic well-being of Kentucky."

Funding for the project was provided by the Kentucky Agricultural Development Fund, along with UK's College of Agriculture, Food and Environment, the Kentucky Horse Council, and numerous other industry organizations and individuals, a complete listing of which can be found on the project's website. More information about the 2012 Kentucky Equine Survey, including a copy of the final report and appendices, can be found at [www2.ca.uky.edu/equine/kyequinesurvey](http://www2.ca.uky.edu/equine/kyequinesurvey). **UK**

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

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## Kentucky Equine Survey's Horse Health Implications

The recently released 2012 Kentucky Equine Survey results don't just reveal important information on the economic impact data of the commonwealth's equine industry, they also open the door for new horse health surveillance and disease mitigating measures.

Craig Carter, DVM, PhD, Dipl. ACVPM, director of the UK Veterinary Diagnostic Laboratory, explained that simply knowing how many horses reside in Kentucky will help improve disease surveillance; for epidemiologic (the study of determinants of disease in populations) purposes, this is termed the denominator.

"From an epidemiological standpoint, the denominator on your data is almost like a mind-expanding thing to have," he said. "In theory it sounds simple, but getting the denominator data is not easy—especially in animals.

"Without the denominator, all we can really report is absolute numbers, or maybe trend absolute numbers or diagnoses, deaths, and illnesses over time—and that's a good thing to do," Carter explained. "That's still good data, but it's not giving you the precision that you get when you're able to look at the incidence, morbidity, or prevalence data."

For the first time in Kentucky for the horse, researchers and scientists can now evaluate factors such as the morbidity and mortality rates of certain diseases, disease incidence and prevalence, and disease risk.

"Those things all rely on having denominator data," Carter said. "It really will help us to get a much better handle on how diseases in the horse are impacting different regions of the state."

Similarly, E.S. "Rusty" Ford, equine programs manager for the Kentucky State Veterinarian's office, said the data obtained in the survey will help during equine



## Kentucky Equine Survey

disease outbreaks.

“Without question, an important factor when mitigating identified risks and developing specific disease management strategies is knowing the population and demographics you are dealing with,” Ford said. “The survey data now provides us with knowledge we haven’t always known to be factual, and in some instances was simply speculative.

“Information is knowledge,” he continued. “And the more knowledge we have—in this instance factual population and demographic numbers, how the horses are used, etc.—will be beneficial as we continue to work to ensure our equine athletes have a safe, healthy and viable environment to participate.”

Carter said the survey data will also

help his laboratory produce more detailed disease maps, which will include information such as the approximate number of animals at risk in a given area.

“It will (make the maps) more meaningful,” he said. “I wish we had this for all species!”

Ford concluded, “I don’t know that you can define any single portion (of the survey) to be of greatest benefit, but as a whole, the survey is invaluable by simply helping to expand our knowledge and demonstrating the importance of Kentucky’s equine industries. In my opinion, the opportunity provided by developing and expanding new relationships to parts of our industry that may not have been visibly or significantly appreciated is a positive for growing our future.” **UK**

>Erica Larson is the news editor for TheHorse.com.

## UK, Kentucky Horse Park Partner to Improve State Watershed

The University of Kentucky College of Agriculture, Food and Environment and the Kentucky Horse Park Foundation partnered in 2013 to make substantial improvements to the Cane Run Watershed, an important water resource for the region that is also currently on Kentucky’s 303(d) list of impaired streams. The two largest property owners within the watershed are UK’s Agricultural Experiment Station and the Kentucky Horse Park.

The collaboration is part of a longer-running project and a partnership between UK and many Kentucky organizations that began in 2006. It was funded in part by a \$1.8 million grant from the U.S. Environmental Protection Agency under 319(h) of the Clean Water Act through the Kentucky Division of Water to the University of Kentucky in 2007. In turn, the Kentucky Horse Park Foundation gave a sub-grant award of \$260,000 to UK in March 2013, with plans to bump that up to \$465,000, said project lead Stephen Higgins, PhD, director of environmental compliance for UK’s Agricultural Experiment Station.

According to the [project website](#), the Cane Run Watershed encompasses approximately 29,000 acres and is located in Fayette and Scott counties. It originates underneath urban areas on the north side of Lexington and is conveyed through a series of storm drains, pipes, and restricted channels. As Cane Run continues on the surface, it joins with other tributaries and travels through parks, open green spaces, and agricultural lands.

The Cane Run Watershed is an important water resource because it supplies water to the Royal Spring Aquifer, which is the major source of drinking water for the city of Georgetown, Ky. Segments of the waterway have been identified as having high levels of pollutants such as sediment, pathogens, and nutrients. Some of this pollution is called “point source,” as it comes from a defined location, such as a leaking sewer pipe, a sewer manhole overflow,

## STUDENT SPOTLIGHT

### BRITTANY HARLOW

From: Dwight, Illinois

Degrees and institutes where received:

- B.S. Animal Science, Minor: Chemistry, May 2010, University of Ill., Urbana-Champaign
- M.S. Animal Science, Area of Specialization: Equine Nutrition & Microbiology, December 2012, University of Kentucky, Lexington



Doctoral student Brittany Harlow’s graduate research has been focused on exploring options for reducing gastrointestinal conditions in the horse, specifically those associated with disturbances in hindgut bacteria, increased hindgut acidity, antibiotic-associated diarrhea, colic, and even laminitis.

“My academic and personal interests have always revolved around a love of horses and science,” she said. “When offered the opportunity to study under world-renowned equine nutritionist Dr. Laurie Lawrence (PhD, professor in the animal and food sciences department at UK) in collaboration with the USDA’s Dr. Michael Flythe (PhD, forage-animal production research microbiologist within the U.S. Department of Agriculture) in the horse capital of the world, there was no way I could refuse.”

Harlow’s research projects have focused on exploring alternatives to commercially available antibiotics, such as plant-derived antibacterial products and their potential application in equine medicine. Moreover, she would like to study the steps in laminitis development caused by carbohydrate overload and potential dietary intervention strategies to reduce bacterial disturbances.

Currently, Harlow is studying the effects of starch sources, such as corn, oats, wheat, and starch level on disturbances of the equine hindgut bacterial community.

“Hopefully my graduate research will provide insight into mechanisms of carbohydrate-related hindgut bacterial disturbance and could contribute to the development of intervention/prevention strategies to lessen these disturbances,” Harlow said.

Harlow said she also hopes her research will further current knowledge and provide a better understanding of the important relationship between the horse and its hindgut bacterial population microflora, and its role in equine nutrition and health.

After completing her PhD, Harlow plans to pursue a career in academia, where she would like to continue research in the area of equine gastrointestinal microbiology and related disorders. **UK**

>Shaila Sigsgaard is an editorial assistant for the Bluegrass Equine Digest.

## Improving State Watershed

or an industrial discharge. More commonly, the pollution sources are “non-point source,” meaning pollution comes from a wide range of agricultural and urban sources that are not discretely defined. These could include livestock in the creek, erosion from construction sites, failing septic systems, pet waste, and lawn and agricultural fertilizers. Because of this pollution, Cane Run is unable to support aquatic wildlife habitat and is unfit for primary contact recreation, such as swimming.

“The partnership between UK and the Kentucky Horse Park is yet further evidence of the park’s commitment to the environment and our determination to be a positive example for other equestrian facilities,” said John Nicholson, Kentucky Horse Park executive director. “This project, in addition to being the right thing to do for our land and our water, has also had a number of good practical effects, including much better drainage, both in the barn areas and around the rings. Dr. Higgins has been super to work with, and he has made a lasting contribution for the Horse Park. We are all grateful to the Kentucky Horse Park Foundation for being the vehicle that allowed this great endeavor to move forward.”

Higgins said some of the project’s results that will be noticeable to the public include aesthetically pleasing riparian areas (the interface between land and a river or stream), bioswales (landscape elements designed to remove silt and pollution from surface runoff water), and wetland areas. Signage is also being placed to identify and describe project areas and the benefits these projects have on the environment.

The public awareness and educational component is an important part of the project’s scope, he said, offering opportunities to educate visitors about environment and water issues. Publications, handouts, and flyers are available, and the team also plans education tours to demonstrate the implementation of environmental best management practices.

“The projects are designed to prevent, control, and trap pollutants from entering the waters of the commonwealth. This is accomplished by trapping sediment, filtering runoff, providing infiltration areas,” Higgins said. “Treatment systems are also being implemented



COURTESY CAFFE/AG COMM

Projects include aesthetically pleasing riparian areas, such as this one that has grown (top to bottom) from 2010 to 2013.

to destroy harmful pathogens, utilize nutrients, and collect sediment. Storm water runoff or clean water diversion projects are also being implemented to

**“The projects are designed to prevent, control, and trap pollutants from entering the waters of the commonwealth.”**

**Dr. Stephen Higgins**

keep clean water clean, which eliminates the need to spend funds on clean water contaminated with pollutants such as sediment.”

Other elements of the project include installing waterers to increase their longevity and reduce mud and installing feeding areas and heavy traffic areas in horse pastures to reduce erosion.

“Our latest work has been on installing all-weather surfaces on riding trails to reduce erosion and increase horse and rider safety. We have also constructed a covered manure stack pad to store the muck out of the weather,” Higgins said. “We have fenced off riparian areas and moved watering fountains to locations that are better for water quality. Other projects include bioswales, dredging the sediment from the pond, projects to reduce the sediment load, rain gardens, settling basins to capture eroded stone, and a wetland.”

“This is a perfect project for the College of Agriculture, Food and Environment, the Lexington Fayette Urban County Government, and the Kentucky Geological Survey,” said Steve Workman, PhD, Kentucky Experiment Station Associate Director and assistant dean within UK’s College of Agriculture, Food and Environment. “The karst (a landscape formed from the dissolution of soluble rocks including limestone, dolomite and gypsum and characterized by sinkholes, caves and underground drainage systems) geology of the Cane Run is somewhat unique with the existence of the Royal Spring Aquifer directly under the Cane Run in numerous locations. The Royal Spring and Cane Run diverge at the Horse Park where the College and KGS monitoring stations are located.

“All water that enters the watershed above the divergence point can either be monitored with the surface flows in the Cane Run or the subsurface flows in the conduit that makes up the Royal Spring. Environmental benefits due to projects of this type and alterations to the watershed as a result of LFUCG compliance with the EPA Consent Decree can be monitored. In addition, significant education opportunities exist with land owners, homeowners, and school systems impacted.”

“This project would not have been possible without the passion and drive of our project team members, the willingness and assistance of our project stakeholders to participate, and the cooperation of the Kentucky Division of Water,” Higgins said. **UK**

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



## Stuart Brown Named 2013 Friend of UK Ag Equine Programs

Stuart Brown, DVM, a Lexington-based veterinarian, was named 2013 Friend of the University of Kentucky's Ag Equine Programs during its Equine Science and Management reception Sept. 3 at Spindletop Hall.

Brown specializes in equine reproduction with Hagyard Equine Medical Institute. He serves on the UK College of Agriculture, Food and Environment's Equine Advisory Committee, Veterinary Diagnostic Laboratory Advisory Committee, and the Gluck Equine Research Foundation Board and has been an active advocate for UK's equine programs for many years.

"While not a UK graduate, Stuart 'sees blue' when it comes to our equine programs," said Marci Hicks, director of development for UK's College of Agriculture, Food and Environment and Brown's nominator. "Not only does he believe that the University of Kentucky should be the epicenter of education,

research, and service for the equine industry, he actively works to make this vision a reality through his leadership, guidance, and financial support. His involvement touches every element of our equine programs, from the undergraduate degree program, to the Gluck Equine Research Center, to multiple extracurricular equestrian teams."

"Stuart is considered one of the best scientific minds among the internationally distinguished local veterinary community," said Nancy Cox, MS, PhD, associate dean for research in the College of Agriculture, Food and Environment and Kentucky Agricultural Experiment Station director. "He is frequently asked to serve on review panels to select programs for research funding, and he provides scientific advice to equine researchers in



Dr. Stuart Brown has been an active advocate for UK's equine programs for many years.

the college. In his role as adviser to the Kentucky Thoroughbred Owners and Breeders Foundation, he has provided comments and improvements to proposals that have resulted in more than \$1 million for equine research at UK. He has impeccable scientific judgment and great 'horse' sense and has made a difference in so many ways."

Brown joined Hagyard Equine Medical Institute in 1991. His practice primarily focuses on broodmare reproductive evaluations, purchase evaluations including radiographic and endoscopic examinations for horse sales at public auction, routine herd health preventive medicine, routine primary care, and federally required testing for the international importation and exportation of horses. He is a Member at Hagyard and has served on its executive committee for the past 12 years, where he has been actively involved in the management and planning of this multidisciplinary practice.

Brown earned his bachelor's from Transylvania University and his doctor of veterinary medicine degree from Tuskegee University. He is a member of the American Veterinary Medical Association, Kentucky Veterinary Medical Association, Kentucky Association of Equine Practitioners, Kentucky Thoroughbred Farm Managers' Club, American Association of Equine Practitioners, and the Society for Theriogenology.

"UK Ag Equine Programs is fortunate to have a number of individuals who are generous with their time and efforts, and we are especially grateful for Dr. Brown's numerous contributions for many years," said Jill Stowe, PhD, director of UK Ag Equine Programs and associate professor in agricultural

## WEED OF THE MONTH

**Common name:** Bitter sneezeweed

**Scientific name:** *Helenium amarum* (Raf.) H. Rock

**Life Cycle:** Warm season annual

**Origin:** United States

**Poisonous:** Yes

Bitter sneezeweed is distributed across much of the United States, from Texas north to Kansas and Missouri and eastward to the Atlantic coast. It grows frequently in pastures and can infest entire pastures in western portions of Kentucky. Overgrazing increases the abundance of bitter sneezeweed. Seed germination occurs in late spring or early summer. The plant's leaves are narrow and threadlike and alternate along the stem. The flowers are bright yellow and bloom from late June through September under Kentucky growing conditions.

This species contains toxins that might cause digestive disturbance, appetite loss, and neurologic problems. Horses generally avoid eating bitter sneezeweed, and most problems occur in the late summer when the plant is flowering.

Bitter sneezeweed can be controlled with herbicides. Mowing will reduce seed production but generally is not effective in killing this plant. Hand weeding is effective to remove small infestations. Consult your local Cooperative Extension Service personnel for herbicidal control in your area. **UK**



SANDI EISENMENGER

>William W. Witt, Emeritus Professor, Weed Scientist, University of Kentucky, provided this information.

## Stuart Brown

economics. “He works quietly behind the scenes, but his leadership has been instrumental in securing important research projects and in making beneficial industry contacts.”

“Stuart has been the ideal utility player for so many milestones of UK Ag Equine Programs; as part of the committee that refocused the Veterinary Diagnostic Lab, then the one who found our excellent director candidate,” Cox said. “Most recently, Dr. Brown helped raise matching funds required to complete the Kentucky Equine Survey, single-handedly bringing in at least \$30,000 to the project, and notably and importantly helping these companies see how much economic analyses are needed to inform

strategies for health products. He is one of a handful of trusted ‘go-to’ people we couldn’t function without.”

The Friend of UK Ag Equine Programs was created in 2005, when the program was called the Equine Initiative, to recognize a member of the public who had provided advocacy, funding, or other extraordinary support for the UK College of Agriculture, Food and Environment’s equine programs or a college or university employee who had generated an exceptional relationship with stakeholders that manifested into a new program, new advocacy success, or new resources for the program.

“Dr. Brown’s reputation in the veterinary and equine communities is that of a visionary, dedicated to improving the health of the horse as well as the soundness of the horse industry globally,”

said Norm Luba, executive director of the North American Equine Ranching Information Council and chair of the College’s Equine Industry Advisory Committee. “The University of Kentucky is fortunate to have Dr. Brown’s wisdom in steering its equine programs to the forefront of worldwide recognition.”

Past Friends of UK’s Ag Equine Programs include Luba; Dan Rosenberg of Rosenberg Thoroughbred Consulting; Northern Kentucky county extension agent trio Don Sorrell of Campbell County, Dan Allen of Kenton County, and Jerry Brown of Boone County; and David Switzer of Kentucky Thoroughbred Association/Kentucky Owners and Breeders Association. **UK**

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

## Weed Management Plans for Horse Pastures

Fall is a good time to evaluate the quality of horse pastures and determine which weeds were most prevalent and uncontrolled during the summer. These weeds will now be large and seed-producing. It is also a good time to develop a pasture weed management plan for the coming year.

An effective weed management plan should consider the purpose of the pasture, weed species and abundance, which weeds should be controlled and how, and resources.

### Purpose of the Pasture

If pasture is a significant portion of a horse’s diet, it should be high-quality and nearly weed-free. Conversely, a “pasture” maintained as a drylot for feeding horses will contain many weeds. There is little reason to control these weeds since there are few, if any, desirable forages in the drylot. Kentucky horse pastures are usually maintained between these two extremes. Frequently asked questions from horse owners include, “Why are these weeds in my pasture?” and “What should I do about weeds in the pasture?” Ensuring pastures have adequate fertility and are not overgrazed will help limit weeds but will not prevent all weeds from growing.

### Weed Species, Abundance, and Distribution

Weeds grow in ecological niches—environments that allow for germination, vegetative growth, and maturation. A horse pasture offers several of these ecological niches in which weeds thrive.

Kentucky is located in the temperate transition zone, which allows warm-season or cool-season plants to grow. Warm-season weeds germinate in spring or early summer, grow, and produce seeds before frost. Cool-season weeds germinate and produce some growth in the fall and produce seeds the following spring or summer. The numerous weed species provides



Pastures provide ecological niches in which weeds thrive.

horse pasture managers with the challenge of determining what weeds, if any, they should be controlling in a pasture. The most abundant weeds in horse pastures are usually annual species that produce thousands of seeds.

For instance, spiny pigweed, also known as spiny amaranth, produces more than 100,000 seeds per plant. This weed is widespread and grows most often in compacted areas along fences and around feeding and watering areas of pastures. Spiny pigweed is also a “patchy” weed that grows only in certain portions of the pasture where its ecological niche occurs.

### Which Weeds to Control and Methods to Use

Generally, property owners should remove from pastures poisonous weeds and those that inhibit grazing. Poison hemlock occurs widely across Kentucky and is toxic to horses and other animals. Although rarely eaten by horses, it should be removed from pastures. Musk thistle and bull thistle are found throughout Kentucky and inhibit grazing. Canada thistle occurs less frequently but also inhibits grazing and is more difficult to control. Large crabgrass and yellow foxtail are warm-season grasses of summer. Horses graze the large crabgrass but not yellow foxtail. Buckhorn plantain is a cool-season plant that horses consume when pasture grass is limiting. Many small, tender weeds are nutritious and readily consumed when small but rarely consumed as large plants.



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<sup>2</sup> Manley L, Caceres P. Retrospective Cohort Study of an Equine Influenza Outbreak in the Chilean Army in the Metropolitan Region of Santiago, Chile, during 2006, in Proceedings. 12th Symposium of the International Society for Veterinary Epidemiology and Economics, Durban, South Africa 2009:64.



## Weed Management

Methods of removing weeds from horse pasture are limited to hand removal, mowing, and herbicides, and each have advantages and disadvantages. Hand weeding can be very effective and is particularly useful for removing poisonous plants such as poison hemlock. The downside of hand weeding is that the process is slow and inefficient for large areas.

Mowing is rarely effective for killing pasture weeds. Mowing low enough to kill the weeds (2 inches or less) removes valuable forage. Mowing heights of about 6 inches will keep some large weeds from producing seeds but does not control smaller weeds.

Herbicides are efficient and provide excellent control, but in transition zone areas, such as Kentucky, there is not one herbicide that will control all the weeds with one treatment.

There are optimum times to control weeds with herbicides. The following months are preferred for herbicide treatment of several weedy species in Kentucky:

**October-November:** common chickweed, henbit, purple deadnettle, dandelion, buckhorn plantain, musk thistle, bull thistle, Canada thistle, and poison hemlock.

**February-March:** buttercups, curly dock, broadleaf dock, and chicory.

**May-July:** spiny pigweed, white clover, hemp dogbane, goldenrod, cocklebur, perilla mint, common ragweed, and jimsonweed.

Consult your local Cooperative Extension Service agricultural agent for specific information on herbicides in your area. Remember, not all herbicides are registered for use in all states and countries, so read the label carefully and follow all directions. Many Cooperative Extension Services have publications regarding weed control in pastures. These include [Broadleaf Weeds of Kentucky Pastures](#), AGR-207, and [Weed Management in Grass Pastures, Hayfields, and Other Farmstead Site](#), AGR-172. **UK**

>William W. Witt, Emeritus Professor, Weed Scientist, University of Kentucky, provided this information.

## UK Veterinary Diagnostic Laboratory Launches New Website

The University of Kentucky Veterinary Diagnostic Laboratory (UKVDL) launched a new website aimed toward veterinarians, farmers, animal owners, and organizations.

The user-friendly website ([www.vdl.uky.edu](http://www.vdl.uky.edu)) provides information on testing, prices, turnaround time, publications, and updated information on diagnosed diseases on a county-level basis in Kentucky. People can search for tests offered by animal species, discipline, and keywords. Submission forms, shipping guidelines, and complete instructions on how to submit samples are available as well as contact information and directions to the laboratory.



This is the first phase in the redesign of the UKVDL's electronic capabilities. New, on-demand historical information will allow visitors to choose species and disease of interest and immediately see a graphic interface displaying the last three years of data in a new epidemiology information section. In the future, this section will display custom geographic distribution of diseases.

The second phase of the redesign will include the launch of a new client portal on the website, which will allow searches for previous submissions, final reports, and online bill pay. These features will be available in the next six months.

The UKVDL is also testing a mobile application. This would allow for disease differential diagnosis, sample guidelines, and for veterinarians in the field to access various forms.

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## Amino Acid Requirements for Horses

Amino acid. Sounds like something leaking from a Spanish battery, rather than a supplement you'd want to give to your horse.

But an acid isn't always something that burns or is even "acidic." In this case it describes a specific order of molecular composition. And amino comes from the word "amine," which refers to a kind of organic compound.

So yes, they're fine to give to your horse. No, let's rephrase that: Amino acids are critical to your horse's health. There are 21 different amino acids used as building blocks to form proteins. Your horse needs all 21 of these building blocks to build those proteins in his body. The power of nature is such that a horse can create 12 of those amino acids himself without a dietary source (other than carbon and nitrogen). For the other nine, however, he'll need some outside help.

The nine amino acids not created in a horse's body are called the essential amino acids, which horses acquire through their food. Fortunately, there's no need to memorize the names of these nine amino acids and make checklists to be sure your horse is getting them through his feed and hay. According to Kristine L. Urschel, PhD, assistant professor of equine science at the University of Kentucky's Department of

Animal Sciences, in most circumstances all it takes is feeding your horses good-quality hay and commercial feed adapted to the horse's age and activity level—and following the specific feeding instructions for that feed.

"Good-quality horse feeds have been designed to meet the protein and amino acid requirements of horses as long as they are fed according to the directions," she said.

If you want more details as to whether your horse's diet is meeting all of its nutrient requirements, the National Research Council offers a free online tool at <http://nrc88.nas.edu/nrh>. However, you will need to have a basic knowledge of the actual nutrient composition of the diet components to use this tool. You might be able to obtain some of this information from the feed's guaranteed analysis or possibly from the hay supplier; however, in some cases it might be necessary to send the feed to a laboratory for analysis to know exactly what is in it.

Although quality horse feed has been designed with amino acid needs in mind, researchers do sometimes question whether horses are getting the right amount of three of the amino acids in their commercial feeds. Lysine, threonine, and "possibly methionine could be amino acids that we do need to worry a little more about because 'typical' ingredients may not provide enough," said Urschel. "We know more about lysine than the other two (more research has been

done), so most commercial feeds include some amount of free lysine (supplemental lysine included in the mix) to make sure requirements are met."

Amino acids are also provided in grass, Urschel said. But is it enough? "Whether pasture only provides optimal levels of the amino acids for optimal growth or performance or longevity, we still don't know," she said.

Horses do need more

amino acids when they're growing because they're producing muscles, which are built from proteins, she said. Increasing the feed quantities according to commercial feed directions for young horses should satisfy this increased demand. Whether horses need additional amino acids during periods of intense exercise is not yet clear, but Urschel said she suspects the needs "are likely to change to some extent." Likewise, as horses reach a very advanced age, they

could also need additional amino acids to maintain muscle mass, but research in this area is needed.

Some horse owners do like to supplement two amino acids—leucine and tryptophan—because of their supposed effect on horses, Urschel said. Leucine has been shown in some species to promote muscle growth, and tryptophan has been suggested to have a calming effect on horses. However, she says, no research has been carried out on leucine's effect on muscle growth in horses, and the limited research on tryptophan in horses does not provide much (if any) support for its use as a calming agent.

"For the most part, (supplementing these amino acids) is simply pretty unnecessary," said Urschel. "There is no benefit to adding amino acids over and above the requirements. It's a really expensive way to create urine—which is ultimately where the unnecessary amino acids end up."

Urschel suggested there are better ways of spending your nutrition budget: "From a cost perspective you will be much further ahead to work with an equine nutritionist to make sure the diet meets all of the horse's requirements than try to micromanage the individual amino acid intakes." UK

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## L. intracellularis Research Review

Researchers are always working to better understand a bevy of horse health problems. And while moving forward is the ultimate goal, sometimes it pays to look back at what previous research has revealed.

During his recent PhD defense seminar at the University of Kentucky,

Allen Page, DVM, presented a review of *Lawsonia intracellularis*, described his research on the bacterium, described its seroprevalence in a horse population, and characterized factors that could contribute to equine proliferative enteropathy (EPE) infection development.

### Background

*L. intracellularis* is an obligate intracellular bacterium that causes proliferative enteropathy (an intestinal disease) in various species. In horses, EPE typically affects weanlings aged 4 to 7 months.

Page said EPE's etiology remains largely unknown; however, researchers believe it has a fecal-oral route of transmission and that bacteria shedding halts within four to five days of treatment



## *L. intracellularis* Research

commencing. Additionally, he said, veterinarians often see signs of seroconversion (detectable antibody production) and exposure to bacteria in the fall before seroconversion trails off during winter.

*L. intracellularis* infections cause diarrhea, depression, fever, inappetance, weight loss, edema (fluid swelling) on the abdomen or lower limbs, a poor hair coat, and intermittent colic due to thickening of mucosal lining in the small and large intestine. Additionally, Page noted, the disease causes significant economic concern in the Thoroughbred industry: Smaller foals, due to reduced daily weight gain and weight loss, tend to bring lower prices at auction.

Page said veterinarians can use several tests to diagnose EPE, including:

- An immunoperoxidase monolayer assay (IPMA);
- An enzyme-linked immunosorbent assay (ELISA);
- Fecal polymerase chain reaction (PCR), which Page said has a high specificity, but variable sensitivity;
- Protein and albumin concentrations;
- Abdominal ultrasound; and
- Post-mortem exam, which remains the gold standard, Page said.

Fortunately, many horses with EPE recover with treatment. Current treatment options include antimicrobial medication administration, supportive care, intravenous fluid and colloid administration, and plasma transfusions.

Page said researchers are still working to understand exactly why *L. intracellularis* causes problems far more frequently in weanlings than other age groups. Some theories include:

- A decline in maternal antibodies resulting from weaning;
- Post-weaning management changes;
- Internal parasite infections; and
- Poor or immature infection response.

Additionally, researchers are still working to understand:

- What are the roles of interferon-gamma (IFN $\gamma$ , a specific inflammatory mediator) and macrophages (specialized white blood cells that kill and “clean up” damaged tissue and cells) in EPE?
- Why are so many horses exposed to *L. intracellularis*, but so few develop clinical infections?
- Why are there such drastic farm-to-



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farm differences in infection rates?

- What protective mechanisms do horses have against EPE?

Finally, Page offered his hypotheses regarding some of remaining questions surrounding *L. intracellularis* and EPE:

- Horses residing at farms with a history of EPE have a greater risk of developing disease than foals residing at farms with no EPE history.
- Passively acquired antibodies (those the foal receives from his dam) do not have an effect on disease susceptibility.
- Mares do not play a role in the epidemiology of EPE on endemic farms.
- IFN $\gamma$  production in response to *L. intracellularis* challenge is associated with resistance to EPE development.

### Developing a Challenge Model

When Page began studying EPE, relatively little was known about the disease. One of his first accomplishments was developing a challenge model, which would allow veterinarians and researchers to study EPE in a controlled manner.

Page and his mentor, David Horohov, PhD, designed a challenge model whereby they administered *L. intracellularis*, isolated from a previous case of EPE, to six weanlings through a nasogastric tube. The team monitored the challenged weanlings daily for signs of EPE and collected fecal and blood samples for analysis at regular intervals. They also performed weekly ultrasounds to check for thickening of the intestinal walls, and they weighed the foals on a weekly basis. At the end of the study the group performed a necropsy on each of the weanlings, examining the small intestine for signs of *L. intracellularis* infection since this is where the bacteria typically infect the horse.

Researchers are still working to understand why *L. intracellularis* causes problems far more frequently in weanlings than other age groups.

Of the six weanlings challenged with *L. intracellularis*, four contracted forms of EPE. The remaining two showed no signs of EPE, which is consistent with real-world cases where weanlings are exposed to the *L. intracellularis* but never develop EPE.

### Validating an ELISA Test

Next, Page turned his attention to making it easier for veterinarians to accurately diagnose EPE. He and a team of researchers developed a modified ELISA test that detects antibodies to *L. intracellularis*—an easy-to-perform serologic assay able to detect the antibodies and, thus, *L. intracellularis* exposure. Using this test, the team evaluated the seroprevalence (the frequency of individuals in a population that have a particular element in their blood serum) of *L. intracellularis* among 337 Thoroughbred foals and weanlings residing on 25 Central Kentucky farms.

Page and his colleagues found an overall seroprevalence of 68%, with levels on individual farms ranging from 14-100%. Additionally, Page and colleagues found that all farm populations had evidence of *L. intracellularis* exposure, regardless of whether they had logged previous cases of EPE. On average, the *L. intracellularis* seroprevalence was significantly lower on farms with no history of EPE cases than on those with confirmed or suspected EPE cases; and horses residing on farms with no history of EPE cases tended to have lower *L. intracellularis* antibody levels.

### Role of Passively Acquired Antibodies

Next, Page described recent research surrounding passively acquired antibodies' role in infection and immunity to *L.*

## *L. intracellularis* Research

*intracellularis*. His hypothesis was that these antibodies wouldn't affect a foal's immunity to the bacterium.

During the 2012 foaling season, Page and colleagues collected whole blood samples from mares and foals on 15 Central Kentucky Thoroughbred farms within 48 hours of parturition. They collected additional samples from the same foals on a monthly basis through February 2013 for analysis using their ELISA.

Page said the team classified all the horses as presumptive EPE, suspect *L. intracellularis* infection, seropositive, or seronegative. Some key findings from the recent study include:

- Of 453 horses tested, 200 mares and 172 foals were seropositive at parturition.
- The overall seroprevalence was 56.4%, while farm-specific seroprevalences ranged from 11-80%.
- By the time the foals were two months old, no *L. intracellularis* antibodies could be detected in their blood.
- The team classified 11 horses as having "presumptive EPE" and 13 foals as having "suspect *L. intracellularis*" infections.
- When it came to total protein and albumin levels, the presumptive EPE group had the lowest level of all groups, while there was no difference in the levels between the seropositive and seronegative groups.
- There was a significant difference between age at weaning between seronegative and seropositive horses; the former group was weaned at 152 days, on average, while the latter group was weaned at 144 days, on average.

■ Colts were 5.3 times more likely to develop presumptive EPE than fillies.

■ Foals previously treated for a *Rhodococcus equi* infection were more likely to develop presumptive EPE than foals not treated for infections.

■ Foals weaned after August were less likely to develop presumptive EPE cases than foals weaned earlier.

The team also made an interesting discovery regarding where the farms were located and what month had the greatest number of seropositive foals, Page said: Farms located in northern Fayette County had more seropositive foals in October; farms in Bourbon County and Jessamine County had the most seropositive foals in January; and farms in western Fayette and western Woodford counties had the most seropositives in November and December. Page said it is not clear why this geographic separation occurs.

The team has opted to continue the study for another year, and additional results should be available mid-2014.

### Mares' Role in Epidemiology

Page also recently completed research focusing on whether mares play a role in disease development in foals. He and colleagues collected whole blood from 95 mares and 91 foals residing on one endemic farm within 48 hours of parturition and then every four weeks. They found that 42 mares were seropositive at parturition, and mares seropositive for more than five months through October had foals that were 5.667 times more likely to be seropositive between July and January compared to mares with less than five months of seropositivity.

Other data demonstrated that nursing foals failed to seroconvert as a result of

## UPCOMING EVENTS

### October 10, 8 a.m.

14th Kentucky Grazing Conference, Fayette County Extension office, Lexington, Ky.

### October 14, 2 p.m.

University of Kentucky Gluck Equine Research Foundation Board of Directors meeting, Room 118, Gluck Equine Research Center

### October 24, 4 p.m.

Department of Veterinary Science Equine Diagnostic Research Seminar Series, Veterinary Diagnostic Laboratory, Cardiology, Michelle Barton, DVM, PhD, Dipl. ACVIM, University of Georgia

exposure to the bacterium during the same time period that their mares did, suggesting that mares might protect nursing foals from exposure. But based on his data, we "can't rule out mares as playing a role in *Lawsonia* spread."

### Future Research

Although Page and other researchers have made great strides in understanding *L. intracellularis* and EPE, there is still much to learn. Page said future research that would benefit the collective understanding includes challenging nursing and early weaned foals to see if mares provide protection, an assessment of risk factors and exam for reasons for geographic differences in seroconversion, and the use of recombinant proteins to identify antibody responses associated with EPE. **UK**

>Erica Larson is the news editor for TheHorse.com.

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The University of Kentucky College of Agriculture has several equine-related pages on Facebook with the latest news and events information. Stay up-to-date with the latest happenings by following our activity on the following pages:

- [University of Kentucky Ag Equine Programs](#): UK Ag Equine Programs is an overarching framework for all things equine at the University of Kentucky, including the undergraduate degree program, equine-related student organizations, equine research, and outreach activities.
- [University of Kentucky Maxwell H. Gluck Equine Research Center](#): The mission of the Gluck Center is scientific discovery, education and dissemination of knowledge for the benefit of the health and well-being of horses.

- [Kentucky Equine Networking Association](#) (created by the Kentucky Horse Council and University of Kentucky): The mission of the Kentucky Equine Networking Association (KENA) is to provide an educational and social venue for equine professionals and other horse enthusiasts from all disciplines to share ideas and business strategies, and obtain current knowledge on horse and farm management with the principal objective of enhancing individual horse ownership and the horse industry at large.
- [Saddle Up SAFELY](#): Saddle Up SAFELY is a new rider safety awareness program sponsored by UK HealthCare, UK College of Agriculture and many community organizations. It aims to make a great sport safer through education about safe riding and horse handling practices.
- [UK Horse Pasture Evaluation](#): The University of Kentucky Horse Pasture Evaluation Program is a service program offered to horse farms in Kentucky with the goal of overall improved pasture management.