

## Square Peg, Round Hole

### *Understanding round vs. square bale hay for horses*



Reduce hay losses during feeding by offering round bales to horses in covered feeders.

Hay for horses comes in many forms, but the two most common are round bales and small square bales. Both have significant advantages as well as challenges and can be a source of quality forage for horses when managed correctly. In this two-part series, we will explore round and square bales and how to best utilize each. This month's article will focus on round bales.

Before purchasing or putting up hay, remember that forage quality does not depend on size or shape. High-quality (or low-quality) hay can be packaged in round or square, large or small bales. Forage quality is at its peak when harvested at the correct stage of maturity. The extent of quality loss is related primarily to timing, management, and weather conditions. Once baled and stored properly, forage quality losses are minimal over a long period of time. Improper feeding of hay can also lead to quality and quantity losses.

**Process:** Hay-baling can be an expensive endeavor. Producers typically factor in those costs (plus shipping and taxes) to the price of the hay. Making round bales requires

fewer passes over the field and less time, fuel, and twine compared to making square bales. Hence, round bales are often more economical.

Hay baled at higher moisture levels is more likely to heat, causing forage quality losses and potentially even fire. Before storing round bales inside, let them go through a "sweat," allowing the inside bale temperature to return to ambient temperature. See "Hay Fire Prevention and Control" for more information on this topic ([uky.edu/ag/forages](http://uky.edu/ag/forages), click on "horse links").

**Size:** The size of round bales can vary widely depending on the size of the baler and the density of the bales. Round balers can be 4 or 6 feet wide and produce bales ranging from a few hundred pounds to nearly a ton.

Weight also depends on the type of forage baled. Legumes are denser than grasses, so a bale of alfalfa will likely weigh more than a similarly sized bale of grass hay. Water is less likely to percolate into more densely packed bales, so denser bales will hold forage quality better when stored outside.

**Storage:** Ideally, property owners should store all hay inside. However, round bales are commonly stored outside. Outside storage exposes hay to the elements; exposure to moisture can significantly reduce forage quality.

Moisture, in the form of rain, dew, snow, or soil, absorbed from the ground degrades forage quality in two ways. First, water-soluble nutrients, including carbohydrates, vitamins, and minerals, leach from wet hay. Moisture also allows bacteria and fungi to thrive; these organisms feed on protein, carbohydrates, and fiber in the hay, reducing quality and producing dangerous byproducts.

If you must store round bales outside, place them on rock or wood pallets to prevent moisture wicking from the ground. Place bales with flat sides butted firmly together but round sides not touching. Cover bales with heavy-duty tarps, if possible, and avoid storing them under trees, which increases the amount of moisture the bales absorb and prolongs drying.

Never stack bales when storing outside unless they are tarped. One study on round bale storage documented

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## Hay Bales

43% loss and 66% animal refusal when stored on the ground, compared to 2% loss and 3% animal refusal when stored in a barn. Round bales that are held together using “net wrap” shed water better than bales with twine, so consider net wrapping when storing uncovered.

**Handling:** Because you can only move round bales with a tractor or other machinery, this hay form might not be an option for small farms with limited equipment. When feeding large groups of horses, though, the ability to quickly put out a large bale of hay can make feeding easier and less physically demanding on staff. Pulling off large sections of hay by hand and dragging them into stalls is possible, but extremely labor-intensive. When feeding round bales inside, most farms unroll the hay and fork it into stalls; mechanized unrollers can speed up this process.

**The best way to prevent botulism is to purchase quality hay that has been stored properly and to feed it to horses as soon as possible.**

**Feeding Losses:** Feeding losses are a major concern when feeding any hay. Hay producers invest significant effort, time, and money into growing, baling, and storing hay, only for horses to waste it. Round bales stored outside and exposed to the elements often develop a deteriorated outer layer that horses refuse to eat.

Time also increases waste. If a round bale is fed to a small number of animals, they will trample more of it. Reduce feeding losses by using any number of hay feeders, including rings or nets to keep animals from trampling the hay. Covered feeders help limit trampling and weather exposure. Hay feeders come in many styles, types, and sizes; evaluate your options

carefully to select the one that works best for your operation. See the University of Minnesota article “Selecting a Round-Bale Feeder for use During Horse Feeding” for a comparison of feeder types ([uky.edu/ag/forages](http://uky.edu/ag/forages) and click “horse links”). Remember that some feeders require equipment to lift and move. Herd dynamics might also play a role in the type of hay feeder you select. In extremely large herds that consume a round bale in 24 hours or less, unrolling hay might be the best option to allow access for all horses at once.

**Safety:** Because round bales are often exposed to more moisture compared to square bales, they come with a greater risk of mold and botulism. In most cases, mold will do no more than cause forage refusal, but the dust created by mold can lead to respiratory problems.

Botulism is a common bacteria found in the soil. It can thrive in wet hay and has been known to infect horses. The best way to prevent botulism is to purchase quality hay that has been stored properly and to feed it to horses as soon as possible. A botulism vaccine is available. Consult your veterinarian for details. For more information about botulism, see “Botulism: A Deadly Disease that can Affect Your Horse” ([uky.edu/ag/forages](http://uky.edu/ag/forages) and click “horse links”).

**Summary:** Equine operations might find benefits to using round bales. Round baling forage is less expensive than square baling, but proper storage is key to maintaining forage quality and reducing losses. Feeding several horses in a pasture or drylot is easier using round bales, but requires special equipment. Hay feeders, such as rings, nets, or huts, will greatly reduce feeding losses. As always, grazing is far less expensive than any form of hay; good pasture management year-round will prolong grazing and reduce the need for hay.

Next month, we will explore square bales. [UK](#)

>Krista Lea, MS, coordinator of UK’s Horse Pasture Evaluation Program; Ray Smith, PhD, professor and forage extension specialist; and Tom Keene, hay marketing and production specialist, provided this information. All three are part of the University of Kentucky College of Agriculture, Food and Environment’s Department of Plant and Soil Sciences.

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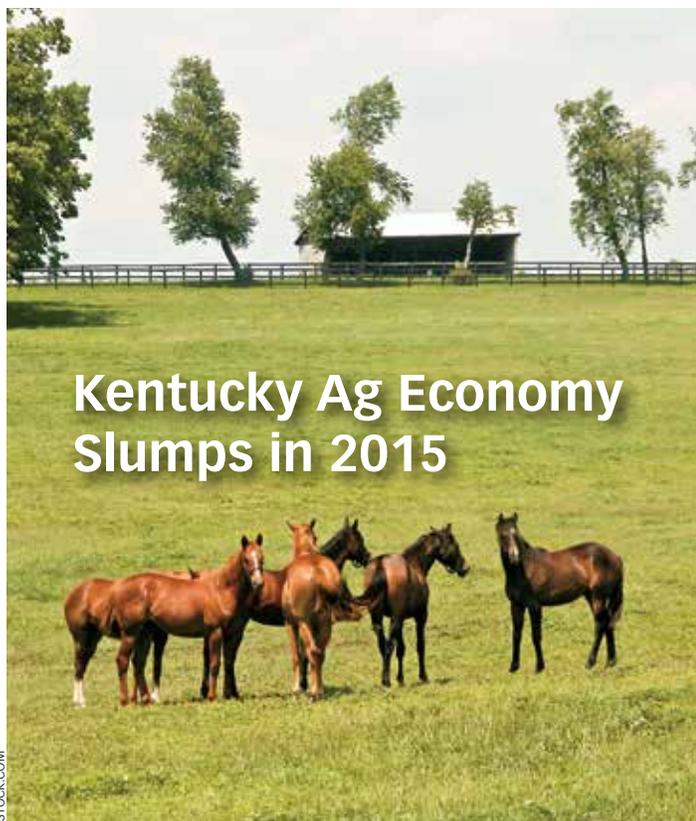
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### The Horse: Your Guide to Equine Health Care

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## Kentucky Ag Economy Slumps in 2015

Kentucky agricultural cash receipts in 2015 are projected to be 8% off from last year's record high, falling to \$6 billion—still the third highest on record. On the national front, the U.S. Department of Agriculture projects cash receipts will be down 10% from 2014. The outlook for 2016 remains depressed.

"One of the major contributing factors to a slumping U.S. and Kentucky ag economy is the decline in ag exports responding to the strengthening U.S. dollar, weak overseas economies, and mounting crop and livestock supplies," said Will Snell, PhD, extension professor in the University of Kentucky (UK) Department of Agricultural Economics.

Snell and other UK College of Agriculture, Food and Environment faculty, including Kenny Burdine, PhD, Todd

Davis, and Tim Woods, PhD, all from UK's Department of Agricultural Economics, Jeff Stringer, PhD, from the Department of Forestry, and Kentucky Farm Business Management Program coordinator Jerry Pierce, shared their agricultural economic outlook for 2016 and an overview of 2015 during the 96th annual Kentucky Farm Bureau meeting Dec. 3 in Louisville.

Though Kentucky crop and livestock receipts are expected to decline 16% and 3%, respectively, in 2015, other factors managed to counterbalance the weakened markets slightly.

"Record high grain yields and strong spring/summer cattle prices, coupled with solid poultry and equine sector figures, helped partially offset depressed fall cattle and grain prices, as well as falling tobacco revenues," Snell said.

Though the cash receipts are often touted, Snell said net income levels are a more accurate reflection of the commonwealth's agricultural economy.

According to UK's estimates, Kentucky net cash income likely will dip below \$2 billion in 2015 and approach the 2010-2012 average of \$1.4 billion in 2016. The state's net cash income peaked at \$2.75 billion in 2013, before slipping to \$2.5 billion in 2014. Declining cash receipts coupled with the end of tobacco buyout payments are the major cause for the projected decline this year and next.

"The bottom line is, after several great, great years, 2015 and 2016 will be a challenge with net income plummeting," Snell said. "Hopefully, farmers put away some of their profits from previous years to weather the current downturn in the ag economy."

Kentucky continues to be livestock-dependent. Poultry remains the top agriculture enterprise with 22% of projected 2015 sales, followed by equine and cattle, each with 16% projected sales, and soybeans and corn at 13% sales.

The equine market held the gains it made the last few years, with the 2015 September yearling and November breeding stock sales slightly higher. There are indications that stud fees will increase in 2016.

A copy of the outlook publication, including information on individual farm sectors, can be found at [uky.edu/ag/agecon/pubs/extoutlook151601.pdf](http://uky.edu/ag/agecon/pubs/extoutlook151601.pdf). UK

>Carol Lea Spence, agriculture communications specialist in UK's College of Agriculture, Food and Environment, wrote this edited release.

## Understanding the Equine Immune System

The immune system is critical to maintaining life in any species. It protects when foreign invaders, such as viruses, parasites, or bacteria, breach your physical barriers—such as skin and mucous membranes—and enter the body. Naturally,

this important system is extremely complex.

Amanda Adams, PhD, equine immunologist at the University of Kentucky's Gluck Equine Research Center, presented an overview of the immune system at the Role of Immunology in Equine Health Symposium, held Nov. 21 in Lexington. She started with some of the basics: What is immunity?

"Immunity is a state of

having sufficient biological defenses to avoid infection, disease, or other unwanted biological invasion," Adams began.

There are three types of immunity: natural acquired immunity, artificial acquired immunity (induced when vaccines are administered), and passive acquired immunity (that which horses acquire via their dam's colostrum at birth). There are also two types of immune

response that are both critical to fighting infection—innate and adaptive—which Adams described in detail.

### The Innate Immune Response

When a pathogen, or disease-causing organism, breaks through the body's natural protective barriers, the innate immune system is activated as the first line of defense. This is the body's built-in immunity to resist

## Equine Immune System

infection, said Adams. The innate immune response is present from birth, not specific for any particular microbial substance (it doesn't matter if the invader is a virus, parasite, or bacteria, the immune system will kick in), and has no memory.

One of the purposes of the innate immune response is to "slow the growth of infectious agents until the adaptive (more pathogen-specific) immune response kicks in," said Adams. It does this by binding immune cells called phagocytes to the offending microbes. These phagocytes then internalize and eventually kill the microbes through a process called phagocytosis.

Specific phagocytes include:

■ **Neutrophils** These are the most abundant immune cells in the blood and the first cells to the site of an infection. "They're on high alert for pathogens in the body," said Adams. After engulfing and killing microbes,

the neutrophil will die; an accumulation of dead neutrophils eventually leads to what we know as pus—a sign of infection.

■ **Monocytes** These innate immune cells also uptake invading microorganisms, but they can do so repeatedly without dying. Further, they're not just present in blood, but can also circulate and scavenge throughout bodily tissues, in which they become macrophages, Adams explained.

■ **Dendritic cells** These are the messengers between the innate and adaptive immune systems. We'll get to their function in a minute.

When pathogens break through the epithelial barrier (skin), epithelial cells release small proteins called chemokines and cytokines, which are "critical in creating a trail or signal to activate the innate immune response," said Adams. They are directly responsible for immune cell-to-cell communication.

When cytokines are produced, they also trigger the inflammatory process

characterized by heat, swelling, redness, and pain. This acute inflammation is actually good, said Adams, because the resulting vasodilation of the endothelial cells attracts and allows for more phagocytes at the site of infection.

This entire innate immune response can happen in seconds and continue for minutes to days, she said.

So, to recap:

- A pathogen breaks through the skin via a laceration, for instance, and enters the body;
- This activates the epithelial cells, which produce cytokines and chemokines;
- Cytokines and chemokines cause inflammation and vasodilation, which attract the phagocytes;
- Inflammation then allows phagocytes to leave the blood and travel to the site of infection; and
- Phagocytes kill the pathogen.

"Not only are phagocytes important for killing pathogens, but they also process the pathogens into antigenic pieces and put the pieces on their cell surface receptors, which allows these cells to show the antigen to the adaptive immune system for activation," said Adams.

### The Adaptive Immune Response

Unlike the innate response, the adaptive immune response is specific to a particular pathogen. As mentioned, the link between innate and adaptive immunity are the more specialized phagocytes: the dendritic cells and macrophages.

"Once dendritic cells have engulfed the pathogen at the site of infection, they leave the tissue and enter the lymphatic system to travel to the lymph nodes to present the pathogen as an antigen to the lymphocytes (white blood cells of T-cells and B-cells)," for recognition, Adams explained. The lymphatic system essentially serves as a highway for immune cells to travel around the body, she added.

Adaptive immunity is learned, is pathogen-specific, is enhanced by second exposure, and has memory. It relies on the innate immune system to communicate information about pathogens in the body, particularly whether a bacteria or virus has invaded.

Two of the adaptive immune system's key components are the cell-mediated immune (CMI) responses and humoral immune responses. The CMI responses

## GRAD STUDENT SPOTLIGHT

### CHRISTINE LATHAM

From: Davie, Florida

Degrees and institute where received:  
**Bachelor of Science in Animal Science at the University of Florida**

Christine Latham chose to study at the University of Kentucky (UK) because of its equine nutrition program. She is currently pursuing her master's degree under Kristine Urschel, PhD, associate professor of equine science.

Latham's research focuses on amino acid supplementation's effects on measures of whole body and muscle protein synthesis in aged horses.

"Sarcopenia, the loss of muscle mass that is commonly seen in aging animals, is a growing issue as animals are living longer," Latham said. "My research examines a possible nutritional intervention that could improve the negative effects of sarcopenia in aged horses."

Within her lab group, Latham has also participated in research projects that focused on estimating threonine (an essential amino acid that promotes normal growth by helping to maintain the proper protein balance in the body) requirements in horses.

As a graduate student at UK, Latham said she has developed critical thinking skills when evaluating literature and experimental design, as well as learned other research techniques common in the nutrition field, including muscle biopsy, time course blood sampling, and the indicator amino acid oxidation method.

After completing her master's degree, Latham plans to pursue a PhD in equine science. **UK**



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

## Equine Immune System

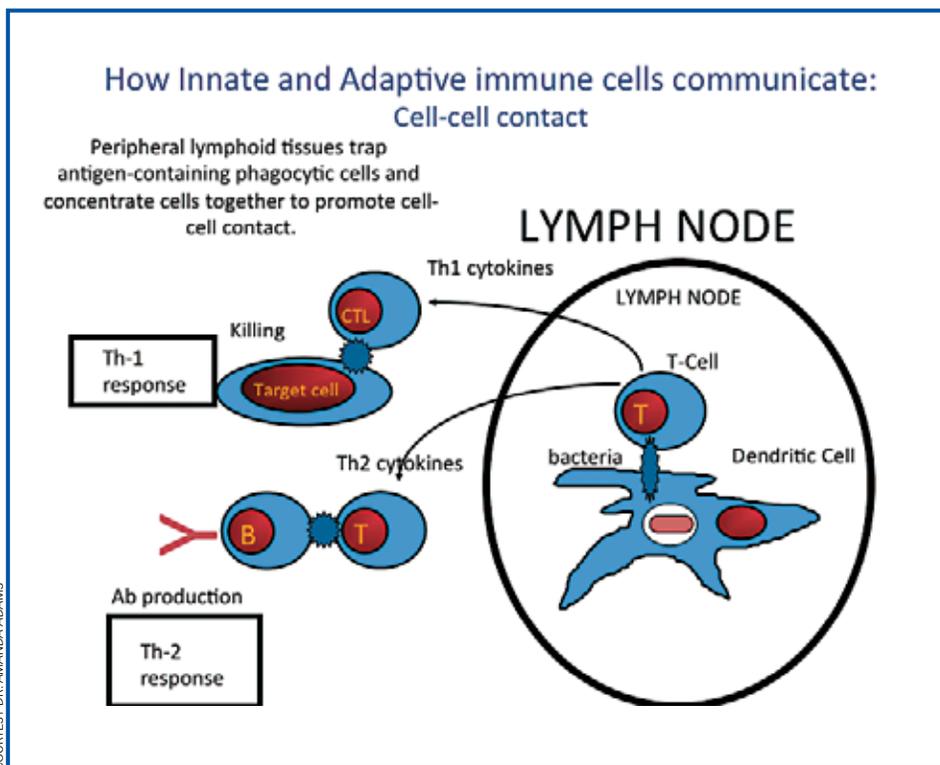
involve T-cells that can kill infected cells in the body (called cytotoxic T-cells) or that can help activate other cells (called T-helper cells). The humoral immune response activates B-cells to become plasma cells that produce antibodies.

To recap:

- The professional phagocytes (macrophage and dendritic cells) process the antigen and leave the site of infection via the lymphatic system;
- Dendritic cells travel to the lymph nodes or other secondary lymphatic tissue sites where they activate the adaptive immune system (T-cells and B-cells);
- T-cells travel back to the infection and kill the pathogen, while B-cells produce antibodies that bind to the pathogen;
- Infection is eliminated; and
- Memory T- and B-cells wait in the lymph nodes for the next infection.

### Take-Home Message

The immune system has to keep up with constantly changing microbes. "This is why the innate response is critical as an immediate defense mechanism," Adams said. "Once the innate immune system becomes activated, it sends the correct signals to the adaptive immune system for activation and to let the system know what kind of pathogen the body has been invaded by. Once this system



is turned on, the infection can be eliminated if there are sufficient levels of activation. More importantly, activation of the adaptive immune response allows for generation of immunological memory to allow for a quicker immune response upon second exposure to that pathogen."

The equine immune system is far more complex than the brief description provided here, and a number of factors (e.g., nutrition, age,

stress, vaccination history, etc.) can impact how well it functions. "Thus, optimal care of the immune system is critical for a properly functioning immune response that allows for sufficient biological defenses to ward off infection and protect the body to sustain life," Adams concluded. **UK**

>Alexandra Beckstett is the managing editor of *The Horse: Your Guide to Equine Health Care*.

## R.E.A.D.

### A Club for Undergraduates Interested in Equine Research

The University of Kentucky (UK) Research in Equine and Agricultural Disciplines (R.E.A.D.) Club was founded in 2011 to provide undergraduates interested in equine research a way to interact with equine

researchers and learn about current research.

Kristine Urschel, PhD, an associate professor of equine science at UK, agreed to be the club's faculty advisor when it was formed and has remained in that position.

"I think it is important that interested students have access to the exciting research going on throughout the department, college, and university," Urschel said. "Oftentimes, research and teaching are kept separate, so students may not be aware of the exciting discoveries being

made at their university or that careers in research are an option post-graduation."

Since its inception, R.E.A.D. has expanded to encompass other agricultural disciplines, and while members focus primarily on equine, they occasionally participate in other livestock research.

The R.E.A.D. Club meets on the UK College of Agriculture, Food and Environment campus once a month for presentations from graduate students, faculty, and industry professionals. Additionally, the club goes

on monthly tours to visit the various UK animal facilities as well as local businesses such as Kentucky Equine Research and Hagyard Equine Medical Institute.

Most student members of R.E.A.D. have an interest in R.E.A.D. science, and many are considering pursuing graduate or veterinarian school. The club supplements the degree programs offered at UK by providing opportunities for networking, independent research, volunteering, and internships.

Sarah Sivinski, the current

**R.E.A.D.**

president of R.E.A.D., joined the club to learn about research and search for research opportunities. Through the club, Sivinski completed an independent research project on equine protein metabolism, presented research at the Equine Science Society meeting, worked on a project at Maine Chance Farm, volunteered in the lab, completed internships under Urschel and in the UK Forage Department, and is currently working on a paper with the Dairy Science Department.

“R.E.A.D. Club offers a multitude of learning and networking opportunities for members and encourages students to expand their horizons into research and other animal studies,” Sivinski said.

Sivinski said the R.E.A.D. Club offers learning and networking opportunities and helped her find her own passion for research. The club goes beyond the classroom and involves members in research and is the only animal or agricultural research club on the UK campus. The club’s ultimate mission is to help students recognize research passions and career opportunities they may not otherwise have.

For more information about the R.E.A.D. Club, please contact [ukyreadclub@gmail.com](mailto:ukyreadclub@gmail.com) or visit [www2.ca.uky.edu/equine](http://www2.ca.uky.edu/equine). **UK**

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

## Maximizing Cooled and Frozen Semen’s Fertility

The use of cooled and frozen semen has, quite literally, given breeders a world of stallions to choose from when selecting a mate for their mares. These products also allow veterinarians to inseminate mares at the ideal time in her estrous cycle, regardless of whether the stud resides around the corner or across the ocean.



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Nearly a third of stallions have sperm that does not withstand the stress of freezing and thawing.

But there are still kinks in the system, and mare owners are sometimes disappointed when the semen fails to result in a pregnancy. Fortunately, there are steps veterinarians and stallion managers can take to help improve the quality of cooled and frozen semen.

At the 2015 World Equine Veterinary Association Congress, held Oct. 8-10 in Guadalajara, Mexico, Ed Squires, MS, PhD, Dipl. ACT (Hon), reviewed some of those methods. Squires is a professor at the University of Kentucky’s Gluck Equine Research Center, in Lexington.

### Cooled Semen

“Even under ideal conditions, not all stallions have sperm that will survive cooling and storage,” Squires explained. “However, there are some common mistakes made in processing and shipping cooled semen that can adversely affect fertility.”

First, veterinarians and technicians need the appropriate equipment with which to evaluate semen and ship it properly.

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## Semen's Fertility

"One must accurately be able to determine sperm concentration using a sperm counter and evaluate motility (movement) using a phase-contrast, heated-stage microscope," he said.

For shipping, sperm should be diluted in an extender to a concentration of 25 to 50 million per milliliter, Squires said. "Generally 1 billion sperm are shipped in a volume of 40 milliliters.

"The only exception to this is that semen can be centrifuged and shipped at a lower volume," he added. At that point, it's generally shipped at a concentration of 100 to 250 million sperm per milliliter.

"This is sometimes beneficial when the sperm quality is initially low and is improved by centrifugation," Squires said.

Another common mistake, he said, is shipping semen that is either too concentrated or too dilute. If it is too concentrated the seminal fluids become detrimental, and if too dilute there could be an absence of nutrients, Squires said.

"The rule of thumb is a dilution rate of at least 3:1," three parts extender to one part semen, he added. "However, the dilution rate of some samples may have to be 9:1 in order to have the sperm at a concentration of 25 to 50 million per milliliter."

Extender choice is also important to cooled semen quality, Squires noted.

"Although there are numerous extenders for cooled semen, most are skim milk-glucose extenders, and the only difference among extenders, in most cases, is the antibiotic in the extender," he relayed.

Semen extenders always contain antibiotics to prevent excessive bacterial growth during storage and shipment.

"Selection of the antibiotic is quite important," Squires cautioned, "since some stallion sperm is sensitive to certain antibiotics."

## Frozen Semen

When it comes to frozen semen, Squires said, the most important factor that can negatively influence its quality is the stallion himself.

"Nearly a third of stallions have sperm that does not withstand the stress of freezing and thawing," he

# THE GRASS GUIDE

## SMOOTH BROMEGRASS (*BROMUS INERMIS LEYSS.*)

**Life Cycle:** cool-season perennial

**Native to:** Central and Northern Europe and temperate Asia, extending to China

**Uses:** Hay, pasture, and soil erosion prevention

**Identification:** A "W" on the upper leaf

Smooth brome grass is a common pasture and hay grass in the northern United States and Canada, but not in the southeastern United States, as it does not tolerate extended periods of high humidity. It grows well on many soil types and tolerates drought and temperature extremes. It is nutritious and palatable to horses, but does not tolerate close and frequent grazing; therefore, it is frequently found along fencerows of horse pastures.

When managing smooth brome grass pastures or hayfields, allow a rest period after grazing or harvesting for long-term stand survival. One of brome grass' advantages over other cool-season grasses is that it holds forage quality well as it matures, making it a nutritious hay for horses. Unlike most cool-season grasses, smooth brome grass will produce seedheads after subsequent cuttings.

Information in the Grass Guides found primarily in "Identification and Adaptation" by Ozzie Abaye. To purchase, visit [uky.edu/ag/forages](http://uky.edu/ag/forages) and click on "Forage Books." UK

>Krista Lea, MS, coordinator of UK's Horse Pasture Evaluation Program within the Department of Plant and Soil Sciences; Ann Marie Kadnar, an undergraduate student in UK's Equine Science and Management Program; and Ray Smith, PhD, professor and forage extension specialist within UK's Department of Plant and Soil Sciences, provided this information.



Smooth brome grass leaves are broad and generally shorter than other cool-season grasses such as orchardgrass or tall fescue.



Smooth brome grass seedhead



There is usually a W-shaped wrinkle across the leaf about one-third of the way from the tip to the leaf's base.

COURTESY UNIVERSITY OF ARKANSAS

explained. "More than likely, these same stallions also do not survive cooling well, either."

He recommended test freezing semen in several extenders prior to actually shipping it to determine which product works best for each individual stallion's semen.

Squires also noted that the cryoprotectant (a substance used to protect tissue from freezing damage) in the extender has a significant impact on sperm's ability to survive freezing and thawing. And, like extenders, some stallions' semen does better in certain cryoprotectants.

# KEEP YOUR HORSE IN THE PICTURE.



Although not well-known, *Leptospira interrogans* serovar Pomona can cause devastating problems. *L. pomona* can colonize in the kidneys, be shed in the urine and the horse can become septicemic, which can potentially lead to abortion, uveitis and acute renal failure. LEPTO EQ INNOVATOR<sup>®</sup> is the first *Leptospira* vaccine developed specifically for horses to help prevent leptospirosis caused by *L. pomona*. It also helps prevent infections of the blood, which could, but has not been demonstrated to, help reduce the potential risk of equine recurrent uveitis, abortion or acute renal failure caused by *L. pomona*.<sup>\*</sup> An efficacy trial demonstrated LEPTO EQ INNOVATOR safely helps prevent *L. pomona* infections and urinary shedding.<sup>1</sup> A safety trial showed it was 99.8% reaction-free.<sup>2,3</sup> To learn more, visit [LEPTOEQINNOVATOR.com](http://LEPTOEQINNOVATOR.com).

<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 Inc.

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

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

## Semen's Fertility

"Glycerol is used in most extenders, but some stallions have sperm that prefer ethylene glycol or methylformamide," he said.

The cooling rate also plays a role in frozen semen quality—to a point. Squires said the rate at which semen is cooled to 5°C (41°F) is critical and dependent on the extender used. On the other hand, how quickly semen is cooled from 5°C to -140°C (-220°F) appears to be less important in maintaining semen quality. Squires recommended using cooling rates of 10 to 50°C per minute.

Researchers have determined that, of the two, the thawing process is more detrimental to sperm than the freezing process. "Ideally," he said, "the cryoprotectant should be removed slowly (during thawing) to prevent swelling of the sperm and rupture of the plasma membranes."

### Take-Home Message

Stallion managers and reproductive veterinarians have an important job when collecting, storing, and shipping semen. Taking a few simple steps can help ensure that semen of the highest quality possible reach the mare and increase the chances of producing a live foal. **UK**

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

## UK Gluck Equine Research Graduate Student Blogs About her Path to Graduate School

Caleigh Fedorka is currently a graduate student at UK's Gluck Equine Research Center. She recently wrote about her journey to graduate school on her blog, *A Yankee In Paris*. An excerpt from her Dec. 6 entry follows. To read the entire blog post, visit <https://ayankeeinparis.wordpress.com>.



Caleigh Fedorka

### A Windy Path to a Unique Career

I am now in the third year of my doctoral degree at the University of Kentucky. One of the only programs which offers a master's and doctorate in Veterinary Sciences, I started this program in an odd turn of events.

Ten years ago, I would have never believed I would be on this route. I had wanted to be a veterinarian practically from birth. I was passionate about animal health, I loved working with the animals, and I was fascinated by medicine. I attended a university with a renowned pre-veterinary route. And then I failed. From one rejection letter to the next, my confidence in myself waned, and my passion for this field wavered.

I now meet so many young students who are either unsure of what they want to do with their bachelor's, or are convinced that veterinary school is the only endpoint to a successful career with animals. And I smile when I meet these people, because I was one of them. I had no idea that this degree existed. That I could be a doctor of philosophy in the field of veterinary science. That there were other options. I tell them of the pros and cons of this degree. I explain to them that I WAS one of them, and that although it took a windy road to get here, I am now happy. **UK**

## Two UK Venture Studio Bootcamp Teams Win Top Awards

Two University of Kentucky (UK) teams with an equine focus recently earned top spots in their respective divisions during a local contest for startup pitches.

The teams—Team Race Assure and Team Serandu—competed as part of the Venture Studio Bootcamp, launched this fall by the Von Allmen Center for Entrepreneurship at UK. Venture Studio is an innovative learning space

located in the new UK Gatton College of Business and Economics focused on immersive training for student entrepreneurs. The Bootcamp is dedicated toward learning, team building, and developing a business model for a new startup. Throughout each weekly session, students gained hands-on experience with a real world project. Students had to apply to compete for a spot on a project team. Each project required a variety of skill sets to ensure a cross-disciplined approach.

A project called "Helping Horses Improve Health and Performance" took top honors against 14 other teams Nov. 20 during a Lexington "Stand Up for your Startup" pitch competition and then again at a Dec. 4 University of Kentucky competition. Team Race



Stephanie Pagano, Kimberly Cecere, and Julia Fabiani were on the winning team, Race Assure.

Assure worked on this project.

Team Race Assure members, from left to right in the photo, include Stefanie Pagano, graduate student in BioMedical

## Venture Studio Teams

Engineering; Kimberly Cecere, an Equine Science and Management undergraduate student; and Julia Fabiani, an undergraduate in both Equine Science and Management and Applied Physiology.

In addition to top honors, the Race Assure team also pocketed the \$1,000 prize.

Their project inventor is David Horohov, PhD, chair of the UK College of Agriculture, Food and Environment's Department of Veterinary Science, director of the Gluck Equine Research Center, and Jes E. and Clementine M. Schlaikjer Endowed Chair at the Gluck Center.

According to the team's synopsis, their marketing of Horohov's invention addresses the issue of athletic training being associated with an

## UK Ag Equine Programs Unveils New Website

The University of Kentucky's Ag Equine Programs unveiled a new website this month. The updated website launch coincides with UK Ag Equine Programs' 10th anniversary and reflects the tremendous progress that's been made in UK's equine programming since it was announced in the spring of 2005.

The site, [ca.uky.edu/equine](http://ca.uky.edu/equine), features updated information about UK's equine programs, including undergraduate and graduate course details as well as information about research, outreach, facilities, and events. The updated site also includes the latest equine news and announcements from UK, a monthly student-focused newsletter, the Wildcat Canter, and the Bluegrass Equine Digest. [UK](#)

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

anti-inflammatory state characterized by reduced production of inflammatory mediators. By contrast, an increase in inflammatory mediators during training

is associated with a failure to adapt to exercise, leading to reduced athletic performance and increased risk for injury.

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### General Information

The Downtown Hilton hotel is located in downtown Lexington within walking distance to restaurants, shopping, night life and area attractions such as Rupp Arena and Triangle Park.

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## Heart of America



## Grazing Conference

January 25-26, 2016

Downtown Hilton  
369 West Vine Street  
Lexington, Kentucky 40507

## Venture Studio Teams

The second UK equine-focused team to come out on top in its division Dec. 4, Team Serandu, marketed an Ultimate Fit Riding Boot and worked under UK faculty members Janet Kurzynske, PhD, and Scarlett Wesley, PhD, both in the UK College of Agriculture, Food and Environment's School of Human Environmental Sciences.

Their team addressed the dilemma that standard sizes do not fit all when it comes to riding clothes and shoes. The drive to produce clothes and shoes economically has forced manufacturers to reduce the variety of size options. This trend is particularly evident in the shoe industry. It is known that humans have great variations in foot anatomical structure from individual to individual but also from right to left feet in the same individual. When you look at a boot, variations are multiplied by ankle to knee anatomical differences. Layer this on top of the various types of equestrian riding boots and their need for functionality. Many equestrians settle for less than an ideal fitting boot, which might reduce comfort, functionality, and safety.

Using 3-D imaging and a personalized manufacturing process, their idea was to create "made to fit" and competitively priced equestrian boots that provide comfort, functionality, and safety.

Team Serandu is comprised of Allison Burke, an undergraduate in Merchandising, Apparel, and Textiles, and Caitlin Halliwell, an undergraduate in Equine Science and Management.

Moving forward, both teams will continue to compete in business plan competitions in the spring of 2016. **UK**

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

## Upcoming Events

### January 25-26,

Heart of America Grazing Conference  
[uky.edu/ag/forages](http://uky.edu/ag/forages)

### January 29, 1-5 p.m.

5th Annual UK Equine Showcase  
<http://2016ukshowcaseshortcourse.eventbrite.com>

### January 30, 8:30 a.m.-4:30 p.m.

7th Annual Kentucky Breeders' Short Course  
<http://2016ukshowcaseshortcourse.eventbrite.com>

## UK DEPARTMENT OF VETERINARY SCIENCE EQUINE DIAGNOSTIC AND RESEARCH

# 2016 Seminar Series

\*All seminars are at 4 p.m. unless noted otherwise below.

UK Veterinary Diagnostic Laboratory Auditorium  
1490 Bull Lea Road, Lexington, KY

### January 28

*Reproduction in Sport Horses*—Etta Agan Bradecamp, Rood and Riddle Equine Hospital.

### January 29 1-4:45 p.m.

*UK Equine Showcase*—Multiple speakers; A program highlighting the university's current equine programs and relevant industry findings, focusing specifically on the equine athlete.

**Location:** Fayette County Cooperative Extension Office

### January 30 8:00 a.m.-4:30 p.m.

*Kentucky Breeders' Short Course*—Multiple speakers; An in-depth program on equine reproduction and horse management issues.

**Location:** Fayette County Cooperative Extension Office

### February 25

*Navicular Disease*—Jim Schumacher, University of Tennessee

### No seminars in March, April and May

### June 30

*How tumors develop from transformed cells to cancer models of multi-stage tumor development*—David Hurley, University of Georgia

### July 28

*Pushing and pulling across the blood gas barrier mechanisms of EIPH*  
—David Poole, Kansas State University

### August 25 3:30-5:30 p.m.

*Animal Genetics Testing and Research Lab Services*—Kathryn Graves, University of Kentucky Animal Genetics Testing and Research Laboratory; Parasitology—Martin Nielsen, University of Kentucky Gluck Equine Research Center

### September 29

*Drug Clearance*—Jennifer Davis, North Carolina State University

### October 27

*Sport Horse Lameness*—Brett Furlong, B.W. Furlong and Associates

### November 19

*Infectious Disease Diagnosis*—Nathan Slovis, Hagyard Equine Medical Institute

For more information: (859) 218-1089  
[jenny.evans@uky.edu](mailto:jenny.evans@uky.edu) or [hannah.forte@uky.edu](mailto:hannah.forte@uky.edu)