

HIGHLIGHTING RESEARCH
AND OUTREACH EFFORTS AT
THE UNIVERSITY OF KENTUCKY

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EQUINE SCIENCE REVIEW

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College of Agriculture,
Food and Environment

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Equine Science Review is a monthly College of Agriculture, Food and Environment newsletter that highlights important equine work happening at the University of Kentucky.



Photo courtesy Jimmy Henning, PhD, extension professor, Plant and Soil Sciences

HELMET SAFETY AND CONNECTION OF HORSESHOES TO OSTEOARTHRITIS ISSUES ARE TWO FOCUS AREAS FOR UK ENGINEERING SENIORS

The University of Kentucky’s Department of Biosystems and Agricultural Engineering has a unique structure. While students receive engineering degrees from the UK College of Engineering, administratively, the department is in the College of Agriculture, Food and Environment. This symbiotic alignment with two of UK’s colleges often fosters a focus on agricultural and/or equine topics in the department’s required two-semester capstone course.

“The senior design capstone course is a perfect fit for addressing engineering problems and challenges faced by the equestrian industry, since we are in Lexington, Kentucky, often referred to as the ‘Horse Capital of the World.’ Our students get first-hand experience integrating engineering design with a local industry’s needs,” said Alicia Modenbach, PhD, PE, lecturer and student services coordinator within the department.

Modenbach co-teaches the course with Mick Peterson, PhD, director of the Racetrack Safety Program and professor, and has advised several teams that have tackled equestrian- or horse-related projects.

“Biosystems engineering blends biology with engineering principles to design solutions for living systems. Many of our students have an interest in medical school, veterinary school or other biomedical applications of engineering, so having the opportunity to work closely with a local industry like the equestrian industry on projects that touch upon so many of those interests is invaluable to our students,” Modenbach said.

The yearlong process of senior



VIDEOS TO EACH OF THE THREE SENIOR PROJECTS ARE HYPERLINKED ABOVE. IMAGES COURTESY UK BIOSYSTEMS AND AGRICULTURAL ENGINEERING.

design helps students experience the wide-ranging and complex problem-solving skills they will need as engineers.

“One thing that is notable about the projects is the way in which engineering touches on different areas of research,” Peterson said. “The projects range from helmet work, which addresses a clear safety issue, to

dynamic transmissibility, which is related to how bones remodel and the generation of an optimal musculoskeletal system for the Thoroughbred racehorse.”

Since at least 2016, every capstone has had an equine-related project. This year, three senior design teams are trying to solve horse and rider problems.

The Dynamic Transmissibility Platform team is exploring if equine osteoarthritis can be lessened or prevented with greater understanding of horseshoes and vibrations up the horse's leg. Advisors include Peterson and Jennifer Janes, DVM, PhD, Dipl. ACVP, associate professor, UK Veterinary Diagnostic Laboratory. More about the team's work can be found [here](#).

The Lateral Helmet Loading team is contributing to developing and establishing ASTM equestrian helmet standards. Advisors include Stephanie Bonin, senior biomechanical engineer, MEA Forensic. More about the team's work can be found [here](#).

The Equestrian Helmet Testing team is focused on translational and rotational acceleration to improve equestrian helmet design, with the goal of preventing injuries resulting from head trauma. Advisors include Bonin, and Peterson. More about the team's work can be found [here](#).

A list of past senior design projects is available [here](#).

| *Karin Pekarchik, MS, senior extension associate for distance learning and founder of the UK Female Equestrian Health and Wellness Community of Practice, provided this information.*

GLUCK EQUINE RESEARCHER ASSISTS IN FDA APPROVALS FOR COVID19 TESTING DEVICE



the field. This self-contained device, which weighs 6 pounds and is the size of a laptop, can produce results within one to two hours.

MatMa-Corp in Lincoln, Nebraska, developed a PCR device that was designed for veterinarians to run real time assays in

It was quickly realized that this technology could play a vital role in the fight against COVID-19.

Ted Kalbfleisch, PhD, associate professor at the University of Kentucky Gluck Equine Research Center, was a part of the collaborating team that led to the MatMa-Corp device receiving emergency FDA approval for COVID-19 testing. This new COVID assay has now been approved for use in CLIA-approved laboratories; future work would be focused on a

device that can be utilized point of care, or in the field testing.

"Being a part of a collaboration of this scale with researchers and resources like those at MatMaCorp and the University of Kentucky CCTS, on a project this impactful, is both incredibly exciting and rewarding," Kalbfleisch said.

| *Danielle Jostes, Equine Philanthropy Director, provided this information.*

EQUINE INNOVATORS PODCAST FEATURES UK'S DR. LAURIE LAWRENCE ON EQUINE NUTRITION RESEARCH



Laurie Lawrence, PhD, professor in the University of Kentucky Department of Animal and Food Science, describes recent equine nutrition research from her lab, covering everything from deciphering forage composition—and an easier-to-interpret hay analysis that's coming—to accurately monitoring obesity in our horses. She also tells us about some common misconceptions about feeding horses.

This [podcast](#) is the sixth episode in the "Equine Innovators" podcast series, brought to you by Zoetis.

You can find "Equine Innovators" on TheHorse.com, Apple Podcasts, Spotify, Stitcher, and Google Podcast.

10TH ANNUAL EQUINE RESEARCH SHOWCASE UNDERWAY VIRTUALLY; TALKS HIGHLIGHTED IN THIS AND UPCOMING ISSUES

University of Kentucky's 10th annual UK Equine Showcase is underway virtually. The event is continuing the life journey theme initiated in 2020 and is emphasizing weanling to yearling horses, presenting both completed and work-in-progress projects relevant to this age group.

Information from the sessions will be covered in this publication, with stories about the Jan. 5 musculoskeletal talks featured in this issue. Look to upcoming stories in our February issue on the nutrition and pasture topics as well as parasitology, vaccination immunology and most common causes of mortality for this age group.

Presenting sponsors include BET, Kentucky Performance Products, McCauley's, Merck, Rood & Riddle Equine Hospital and Tribute Equine Nutrition.

Those interested in attending can still register. Upcoming sessions include:

- **Feb. 2, 6-7:30 p.m. EST, will focus on parasitology, vaccination immunology and causes of mortality.** Talks will include vaccination, immunity and immune response in weanlings; parasitology as it pertains to weanlings and yearlings; and common causes of mortality in this age group.
- **Feb. 9, 6-7:30 p.m. EST will cover hot topics in a mini session format of 10 minutes each,** with updates about equine research literature resources at UK, nocardiform placentitis summary from



PHOTO COURTESY UK COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT.

2020, COVID-19 economic impact and the next equine survey, lab updates, Equine Biological Passport update, genetic diversity project, updates on equine surface research, important parasitology updates and more.

Sessions are available individually, or as a package of four, which includes a recording of the past sessions. There are special rates for farms interested in having multiple employees attend. Students from any university can participate for free. Please contact equine@uky.edu for help in registering for those discounted or free sessions.

Continuing education credit for veterinarians and veterinary technicians has been approved by the Kentucky Board of Veterinary Examiners. Additionally, CEU credit has been approved for American

Registry of Professional Animal Scientists. Register at <https://www.eventbrite.com/e/10th-annual-uk-equine-showcase-virtual-event-tickets-123079454963>. Contact equine@uky.edu with questions about the event or with help registering.

| *Holly Wiemers, MA, APR, is the communications and managing director for UK Ag Equine Programs.*

STANLEY COVERS BISPHOSPHONATES, NSAIDS AND OTHER MEDS IN THE JUVENILE HORSE AT 2021 UK EQUINE RESEARCH SHOWCASE

The University of Kentucky hosted the first session of its 10th annual Equine Research Showcase in a virtual setting Jan. 5.

Scott Stanley, PhD, professor of analytical chemistry at the UK Gluck Equine Research Center kicked off the series and the evening's session with a talk on therapeutic medication usage in performance horses, with a focus on bisphosphonates, non-steroidal anti-inflammatory drugs (NSAIDs) and other medicines in the juvenile horse.

Outlining the steps for drug detection in racing, Stanley provided viewers a background about what drugs are used, how much is allowed and what type of horses could use them in a given situation. Stanley also covered new Kentucky guidelines for drug use.

"Horse racing has the longest established, most elaborate, broad-based and technically-accurate systems for drug detection of any competitive sport," Stanley said.

According to Stanley, there are four key parts of a horse drug testing program. What are you looking for? Where are you going to look for it? How are you going to find it? What does it mean?

Stanley explained that in order to test for substances in horses, testers search for anything not specifically allowed. Only authorized medications may be administered after entering a race, like a NSAID (phenylbutazone) or Salix® (furosemide), yet the rules for these have changed over the course of the past couple of years. Urine and plasma thresholds are also monitored for some therapeutic drugs, and the United States Equestrian Federation's list of prohibited substances (stimulants, depressants, tranquilizers and anesthetics) are looked for as well.

When defining where to look



DR. SCOTT STANLEY COLLECTS BLOOD SAMPLES. PHOTO COURTESY STONESTREET FARM.

for prohibited substances in a horse's system, Stanley said that the performance horse industry frequently uses screened urine samples. This is because most drugs are concentrated and eliminated in the urine and urine samples are relatively easy to obtain. He cautioned, however, that the concentration of a drug in the urine does not correlate well with the effect of the drug in the system.

According to Stanley, another way of testing for illicit substances in a horse is through blood sampling, which he said is the more frequently used test for threshold medications. The concentration of the drug found within the blood screening can be more accurately correlated to the effect of the drug in the system. Other samples like saliva, hair and various tissue samples (liver, kidneys, joint fluid and bone) can also be used for testing.

What does this mean?

Stanley said that for many years, those conducting tests either didn't pay enough attention to the significance of their findings or their testing wasn't sensitive enough to determine concentrations that had no relevance.

"We do have situations where concentration may affect the

horse's appearance or performance, and we need to know when that concentration is no longer present and whether a small amount of therapeutic medication should be allowed as a threshold," Stanley said.

Stanley said one of the most frequent questions he gets from veterinarians is about withdrawal timeframes.

"More times than not, those questions come about with a veterinarian already having formulated an answer, but they want to verify that since the horse is in a competition," Stanley said.

According to Stanley, there are many factors that affect withdrawal times, including the dose, frequency of drug administration, route of drug administration and the drug preparation (e.g. slow release).

With regard to bisphosphonates, Stanley said that they have been approved for use in horses for the last several years but have been around for approximately the past 50.

"Bisphosphonates have been used in human medicine for over 20 years, but they've only been licensed in veterinary medicines since 2014," Stanley said.

He described bisphosphonates

as "bone drugs," the term coined since they interfere with osteoclast activity (inhibit bone resorption).

"The intention is, if we inhibit bone resorption, we get more bone mass added overall," he said.

He explained to viewers that bisphosphonates are synthetic analogues of inorganic pyrophosphate and contain a phosphate-carbon-phosphate backbone. The potency of the bisphosphonates is determined by the carbon side-chains on the chemical structure.

According to Stanley, there are two classes of bisphosphonates typically used, the amino or nitrogen containing class and the non-amino containing class. The non-nitrogen containing bisphosphonates are the ones that are approved for veterinary medicine, and the amino-containing class is commonly used in human medicine.

The two bisphosphonates mentioned by Stanley include the clodronate disodium Osphos® (Dechra) and Tildronate disodium Tildren® (Bimeda). These are licensed and approved for use in the horse for navicular disease. They vary in routes of administration; Osphos® is administered intramuscularly and Tildren® is administered intravenously.

Stanley said there aren't very many studies done to describe how these bisphosphonates work in the horse, what they actually work on and how effective they are. He did point to some studies reviewed on Tildren® from 2007 and 2008 that looked at bone resorption markers.

"These studies did show decreases in biomarker CTX-1, and that was fairly short-lived. They didn't show any histology, and the bone density changes were very difficult to monitor," he said.

The uses of bisphosphonates that have been established as treatments in juvenile horses are disease-associated with the subchondral bone of the fetlock and carpus; osteo-articular pain in any location; pain arising from the thoracolumbar (back) and pelvic regions; prevention and treatment of stress fractures; to improve the action of "poor movers;" and general fetlock pain "when all else

fails."

According to Stanley, significant risks can come with these uses.

"They can and may change the mechanism of action for bone maintenance and remodel. The accumulation of microfractures then may, in fact, leave the bone more fragile," he said. "The turnover of bone matrix is also affected, and the increase turnover would lead to bone fragility as well. There may be a delayed healing process; the damaged cartilage may accelerate bone and joint degeneration; and the potential for the analgesic component may disguise the signs of a more serious injury."

He clarified that the analgesic (drug classification that relieves pain) component is not well documented, but many veterinarians feel that they get an analgesic component for at least 10 days or longer after treatment with bisphosphonates.

Stanley also covered the Kentucky Horse Racing Commission Bisphosphonate Policy. The policy states that a horse under 4 years old shall not be administered a bisphosphonate. If the horse is found to have been administered a bisphosphonate, it will result in disqualification from competition or potentially the reversal of a sale. In addition, the horse would be placed on the Veterinarian's List for a minimum of six months from date of sampling. Horses 4 years and older can be administered a bisphosphonate, providing it has been FDA approved, administered in accordance to label requirements, is for navicular disease and is administered by a licensed veterinarian. These horses are also placed on the Veterinarian's List for a minimum of six months after the last administration.

Stanley also touched on NSAIDs and their widely monitored uses in the juvenile horse. The Racing Medication and Testing Consortium's (RMTTC) current guidelines for the NSAID phenylbutazone recommends a 48-hour treatment window with a maximum dose of 2 grams intravenously.

"There's also a recommenda-

tion for a secondary withdrawal guideline, the minimum recommendation as a secondary non-steroidal is now seven days. In order to avoid violation by the stacking rule, you would have to have a seven-day withdrawal of phenylbutazone if you wanted to use flunixin or ketoprofen at 48 hours," Stanley said.

Like phenylbutazone, if flunixin is the primary drug being administered, there is also a 48-hour treatment guideline. If flunixin is used as a secondary drug, though, it has a six-day withdrawal guideline to stay in compliance with the stacking rule. Ketoprofen, less frequently used, can also be used in the same way, but as a secondary drug it requires a four-day withdrawal to stay in compliance with the stacking rule.

Stanley also briefly touched on the furosemide regulation change. The RMTTC lists furosemide still as "per the regulation of 1.010 urine specific gravity and 100 nanograms per ml of furosemide threshold, and the recommended dose being 500 mg and minimum of 150 mg I.V., four hours before racing."

New regulations in Kentucky and many other jurisdictions are looking at the withdrawal of furosemide within 24 hours.

"The rule currently says that no medication shall be administered of any kind, including furosemide, within 24 hours of post-time," Stanley said.

These are the new rules for Kentucky that went into effect Jan. 1, 2020, for all 2-year-olds and on Jan. 1, 2021, for all horses entered in a stakes race. The rule specifies that these horses shall not be administered any drug, medication or substance including furosemide, within 24 hours of post-time. To regulated this, the threshold concentration of furosemide is 1.0 nanograms per ml in serum in a post-race sample.

| *Sabrina Jacobs, a senior majoring in equine science and management and minoring in wildlife biology and management, is a communications and student relations intern with UK Ag Equine Programs.*

BONE PATHOLOGY IN EQUINE WOBBLER SYNDROME PRESENTED AT 2021 UK EQUINE RESEARCH SHOWCASE

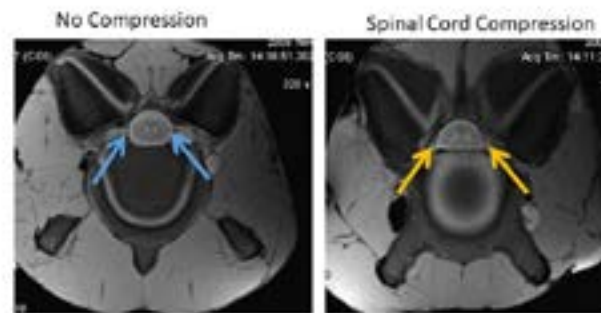
University of Kentucky hosted the first session of its 10th annual UK Equine Research Showcase in a virtual setting Jan. 5. The session emphasized musculoskeletal topics in weanling to yearling horses and presented both completed and work-in-progress projects.

Jennifer Janes, DVM, PhD, Dipl. ACVP, associate professor of anatomic pathology at UK's Veterinary Diagnostic Laboratory presented on bone pathology in equine Wobbler Syndrome during the session.

She focused on the condition seen in younger horses, which can develop anywhere from 6 months to 7 years of age depending on breed.

Janes defined equine Wobbler Syndrome as an equine neurological disease resulting from spinal cord compression in the neck due to vertebral malformations. This is a disease that is caused by skeletal malformations or related pathological changes that decrease the space available in the spinal canal. On a clinical level, it presents as a neurological disorder. The underlying skeletal changes that lead to a stricture or narrowing of the spinal canal can be variable. What they all have in common, however, is a resulting compression of the spinal cord that leads to the observed neurological deficits.

According to Janes, research shows that although the disease isn't gender specific, males are more predisposed to developing wobblers compared to females, by a ratio anywhere from 3:1 up to 15:1 described in the literature. The disease is seen most common-



MR images of the equine neck in the transverse plane. The image on the left indicates no compression (blue arrows). The image on the right indicates compression of the spinal cord (yellow arrows). The image on the right the articular process joints are enlarged and encroaching on the spinal canal.

SLIDE FROM DR. JENNIFER JANES' PRESENTATION. IMAGE COURTESY DR. JENNIFER JANES.

ly in Thoroughbreds, Tennessee Walking Horses and Warmbloods, but can be found in other breeds.

According to Janes, neurologic deficits are typically more severe in the hind limbs than the forelimbs in Wobblers. This is because nerve tracts that control hind limb placement are more superficial in the spinal cord. Thus, they are the first to be compressed due to vertebral malformations.

Janes said Wobbler Syndrome is considered a multifactorial disease with contributing factors including rapid growth, high energy diets and altered copper and zinc. A potential genetic role is suspected but has yet to be specifically characterized. Available treatment options range from conservative management and nutritional changes to surgical intervention. Appropriate treatment recommendations can be made in consultation with a horse owner's veterinarian.

There is evidence showing that horses with Wobbler Syndrome can have increased frequency of osteochondrosis in the neck as compared to unaffected horses. Osteochondrosis is a developmental orthopaedic disorder where the normal transition of cartilage to bone does not occur. In Wobblers, osteochondrosis is located in the articular processes of the cervical vertebrae.

Janes and colleagues investigated articular process pathology in the entire cervical column, comparing horses with Wobblers Syndrome to unaffected horses. The goal was to increase knowledge on the skeletal pathology associated with the disease in order to advance our understanding of the underlying causes and disease mechanisms.

As background, according to Janes, articular process joints in the neck are synovial joints that function to link adjacent vertebrae

in the column. For reference, the knee is a type of synovial joint. This type of joint is composed of two adjacent bones lined by articular cartilage that are connected by a joint capsule and synovial fluid fills the intervening joint space.

The investigative approach was to first quantitatively assess lesions identified on postmortem MRI (magnetic resonance imaging). Secondly, a representative group of identified articular process bone and cartilage lesions were further characterized using micro-CT (computerized tomography) and histopathology.

Findings included cartilage and bone lesions in the articular processes occurred with more frequency in Wobbler horses as compared to controls. In addition, articular process lesions were not limited to only sites of compression but also located at sites away from compression as well. All lesions involving the articular process cartilage were osteochondrosis. Lesions in the bone included bone cysts, areas of fibrosis and osteosclerosis (thickening of the bone).

"Osteochondrosis and true bone cysts support developmental aberrations in bone and cartilage maturation and osteosclerosis was also observed, supporting likely secondary biomechanical influences," Janes said.

Katelynn Krieger, a junior majoring in equine science and management, is a communications and student relations intern with UK Ag Equine Programs.

MACLEOD HIGHLIGHTS SESAMOID BONE MATURATION AT 2021 UK EQUINE RESEARCH SHOWCASE

University of Kentucky hosted the first session of its 10th annual UK Equine Research Showcase in a virtual setting Jan. 5. The session emphasized musculoskeletal topics in weanling to yearling horses and presented both completed and work-in-progress projects.

James MacLeod, VMD, PhD, director of UK Ag Equine Programs and John S. and Elizabeth A. Knight chair at the Gluck Equine Research Center, rounded out the evening with a talk on sesamoid bone maturation and research underway in his laboratory and with collaborators.

It's an important topic, he said, as proximal sesamoid bone fractures are associated with 40-50% of all fatal catastrophic injuries in Thoroughbred racehorses.

He and the graduate students

in his laboratory are in the initial phases of research and starting with a look at what is normal vs. not normal with respect to equine proximal sesamoid bones. That step will help lead to an understanding about how the development processes change with high speed exercise.

According to MacLeod, very little research currently exists about sesamoid bone development. His team hopes to fill in those gaps. The questions they will be asking as they get underway are: How does the structure of proximal sesamoid bones change in response to high speed exercise (racing and other activities)? And can that information be interpreted to determine if there are abnormal structural changes that occur in proximal sesamoid bones that



STUDYING NORMAL PROXIMAL SESAMOID DEVELOPMENT AND STRUCTURE TO FACILITATE RESEARCH ON SESAMOID BONE FRACTURES. IMAGES COURTESY OF THE MACLEOD LABORATORY AND DR. WALTER ZENT.

precede failure (fracture)?

According to MacLeod, in order to answer those questions, his team first needs to know what is normal in size, shape and microstructure; how much variation occurs in healthy bones between individual horses; and what biological variation in age, gender and breed occurs.

As part of this explanation, MacLeod also provided attendees a primer about sesamoid bones.

Sesamoid bones, usually small and triangular in shape, are embedded within a tendon or ligament. They function to absorb and redistribute forces, decrease friction and protect and enhance the power production of connected muscles.

We are familiar with them ourselves. In people, the patella in our kneecaps are examples of sesamoid bones, as are the bones in our feet at the metatarsal junction at the base of our toes.

MacLeod explained that sesamoid bones function as a fulcrum, allowing us, for example, to extend the bottom of our leg from our knees.

The horse has three sets of sesamoid bones. There are two patella, one in each stifle joint –the true knee of the horse in comparison to human anatomy. The navicular bone (sometimes called the distal sesamoid bone) is the second, located in each hoof underneath the flexor tendon. Finally, the proximal sesamoid bones, one medial and one lateral, are found in each fetlock joint. Since horses have four legs (four fetlocks), each horse has a total of eight proximal sesamoid bones.

As MacLeod and researchers in his lab begin their research, they will assemble a sample set of proximal sesamoid bones that reflects normal development and maturation. They'll study them as complete bones, then structurally, then ultra-structurally using CT (computed tomography) imaging. One of the things they'll measure through this process is bone volume compared to total volume of the structure. They'll also look at parameters for the number and thickness of trabeculae within the inner bone meshwork, and their anisotropic or isotropic structural organization. (Isotropic means

the structure is the same in every direction, like glass. Anisotropic is nonhomogeneous, like wood, where the grain alters how it can split apart). The internal organization of trabeculae is frequently an important parameter in the structural and biomechanical properties of a bone.

“With proximal sesamoid bones, a much better baseline understanding of what is normal as a function of age, gender, breed and the individual horse’s size is needed in order to characterize how these small but critical bones remodel in response to high intensity exercise,” MacLeod said. “Our goal with this project is to facilitate research efforts by our group and others around the world trying to develop sensitive ways to detect proximal sesamoid bones at risk of fracture before a catastrophic injury occurs.”

Holly Wiemers, MA, APR, is the communications and managing director for UK Ag Equine Programs.

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EXTENSION AGENTS HOST VIRTUAL 14TH ANNUAL PASTURES PLEASE!! JAN 26

University of Kentucky Cooperative Extension agents and Ag Equine Programs will host a virtual Pastures Please!! pasture management workshop from 6 to 7:30 p.m. EST on Jan 26.

Horse owners, and farm managers will have the opportunity to listen to expert talks, including information about managing carbohydrates in the equine diet, new herbicides and their effectiveness on weed control and wise investments for pasture management.

“This year’s program is driven by the questions that come into extension and the challenges currently facing horse owners,” said Krista Lea, MS, coordinator of the UK Horse Pasture Evaluation Program and one of the event organizers. “Managing carbohydrates

is tough on owners, but a common issue in horses today, and there is as much misinformation as there is information. We have several new pasture herbicides on the market that give managers new options, and now, more than ever, farms large and small are having to take a critical look at their expenses and try to save where they can.”

The event is hosted annually by Central Kentucky extension agents. One of those agents, Linda McClanahan from Mercer County, said the information shared is valuable and applicable for horse owners and managers.

“We are excited to once again be offering Pastures Please, which allows the Cooperative Extension Service to deliver timely information to our horse farm owners and

managers around Central Kentucky and now beyond with the virtual format. Past attendees have indicated Pastures Please!! led to increased profitability through less reliance on feeding hay, decreased weed pressure in pastures and better overall forage management,” she said.

Those interested in participating in this free event can register online at <https://UKPasturesPlease.eventbrite.com>.

Holly Wiemers, MA, APR, is the communications and managing director for UK Ag Equine Programs.

UK'S NIELSEN SECURES ANOTHER FILM AWARD

Congratulations go out to Martin Nielsen, DVM, PhD, Dipl. ACVM, Schlaikjer professor of Equine Infectious Disease at the University of Kentucky's Gluck Equine Research Center for winning a Winnie Award for best educational film at the 2020 EQUUS Film and Arts Fest.

Nielsen was recognized for for his series The Parasite Journey of The Horse. This is the second year in a row he has earned this award.

Learn more about the virtual film festival [here](#). Watch the video on Gluck's Facebook page [here](#).



Join us for the 11th annual
Pastures Please!!
Tuesday, January 26th, 6:00 – 7:30 pm
Virtual Only

Program

- 6:00 Managing Carbohydrates in the Equine Diet,
Dr. Laurie Lawrence
- 6:25 New Herbicides: Do They Provide Control of Troublesome Weeds in Horse Pastures?,
Dr. Bill Witt
- 6:50 Wise Investments for Pasture Management,
Dr. Ray Smith
- 7:15 Questions
- 7:30 Adjourn

Register online at
<https://UKPasturesPlease.eventbrite.com>

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AN EQUINE NEW YEAR'S RESOLUTION: BETTER PASTURE MANAGEMENT

The beginning of a new year is a great time to set priorities for the rest of the year. Focusing some of our efforts on improved pasture management could potentially have positive impacts on our horses, our wallets and the environment. Like many resolutions, it is a yearlong undertaking that requires advanced planning.

Benefits of Improved Pastures

Improving pastures has many benefits that justify the time, effort and potential cost involved. Pastures that have desirable grass cover provide safe footing for horses and, in many cases, all of the nutrition needed to maintain them.

“The most economical way to feed a horse is on pasture,” said Tom Keene, forage agronomist at the University of Kentucky College of Agriculture, Food and Environment.

Stored feeds, such as grain mixes and hay, are significantly more expensive than maintaining a healthy and productive pasture. Weed control in pastures improves the quality and quantity of forage produced, is more aesthetically appealing and reduces toxic plant growth. Finally, a healthy pasture reduces manure and fertilizer runoff into nearby waterways and slows soil erosion.

Planning Ahead

Improving pastures in an economical way requires knowing “the what,” “the how,” and “the when” concerning pasture management. Knowing when to carry out specific practices can sometimes be difficult due to climate differences across the United States. Northern states tend to be dominated by cool-season grasses (those that grow best when temperatures are between 60°-80°F). Southern states favor warm-season grasses



FIGURE 1: YOUR REGION HELPS DETERMINE YOUR PASTURE MANAGEMENT PRACTICES. GRAPHIC COURTESY KRISTA LEA, UK COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT.

(those that grow best when temperatures are 85°-95°F). Transition Zone states, like Kentucky, are in an area where farms can utilize both warm- and cool-season grasses.

Winter

The goal of winter pasture management is to minimize traffic impact on the pasture. This usually means removing horses from pastures or limiting their access, especially during wet periods. Keep horses in a “sacrifice area” during winter months, as heavy traffic will damage most grasses that are now dormant. Exceptions include grazing stockpiled tall fescue, bermudagrass or annual ryegrass.

Stockpiling refers to setting aside grazing areas in the late summer or early fall and allowing forage to accumulate for grazing in the early winter, therefore reducing the need for feeding as much hay. Think of stockpiled forage as hay still standing in the pasture rather than stacked in the barn. Harvesting, baling, transporting and storing hay is an expensive process; grazing stockpiled

grasses allows the horse to harvest the forage in the field, saving you money and time. Grasses such as bermudagrass and tall fescue are excellent for stockpiling because they hold their nutritive value after a killing frost and will survive winter grazing well (when managed properly). Pastures dominated by grasses such as orchardgrass and bahiagrass are not good candidates for stockpiling, as freezing temperatures lower their quality, and winter grazing easily damages them.

Frost seeding clovers into pastures improves forage quality and production. Perform frost seeding in late winter. Broadcast clover seeds four to six weeks before the last frost into pastures that have been either grazed heavily or mowed close. As the ground freezes and thaws, it will expand and contract, working seeds into the soil. These seeds will germinate in early spring. Do not frost-seed grasses and other legumes such as alfalfa, as their success rates are low. Whenever seeding, always use quality seed of improved varieties ideal for your area.

Spring

Spring is all about balancing quality with quantity. Pastures dominated by cool-season grasses will be extremely productive and begin producing seedheads during the spring. Forage quality and maturity are inversely related, meaning that as the plants mature, yield increases while forage quality decreases. Many farms produce more forage in the spring than their horses can keep up with. In these situations, mow or divert excess forage into hay production. Mowing will also remove seedheads, keeping grasses in a vegetative state and improving the pasture’s forage quality.

Seeding is another springtime task. For southern areas, spring and early summer are the only times to seed warm-season grasses such as bermudagrass. Seed or plant bermudagrass via vegetative propagation (planting sprigs). Any planting’s success rests on proper preparation, including weed control and fertility. You can also seed cool-season grasses in the spring, but ideally seed them in the fall, especially in the transition zone and the southern United States. Figure 2 contains a list of common cool-season and warm-season grasses for different areas.

Naturally occurring tall fescue (usually KY 31+) is known to be infected with an endophyte that can produce chemicals toxic to broodmares. This is a significant concern in the transition zone where tall fescue is dominant and large broodmare herds are common. If significant tall fescue is present in pastures, remove broodmares from it during their last trimester. Have the fescue analyzed for endophyte and ergovaline (the toxic chemical) presence in the late spring/early summer, when ergovaline levels peak.

Summer

Summer is all about managing warm-season grasses. This is the time of highest production for warm-season grasses. Horse farms in the south will typically be grazing pastures heavily during this season and haying excess forage. Bermudagrass is very responsive to nitrogen applications; if maximizing yield is important (such as when making hay) add nitrogen applications in the summer. However, if there are not enough horses to consume the forage produced, reduce your nitrogen applications.

In northern locations, most warm-season grasses are consid-

ered weeds. Crabgrass is one warm-season grass that is very nutritious for horses (and they like it). However, it and other warm-season grasses are not desired in cool-season pastures because they die back in the fall, leaving bare areas that problem weeds can fill in. For cool-season pastures, summer is a time to reduce grazing pressure to prevent warm-season grasses from invading. Additional supplementation might be needed in the transition zone, where summer temperatures can persist for extended periods of time and cool-season grass production is low.

Summer is also the time to start planning and preparing for late summer or early fall pasture establishment. Some farms choose to kill pastures completely and re-establish new pastures to greatly improve forage quality and quantity. This usually requires one to two applications of glyphosate to remove all vegetation. High rates of glyphosate are best when controlling difficult grasses such as tall fescue and nimblewill (a warm-season perennial grass that livestock do not consume). Space glyphosate applications about six weeks apart; apply the first application in the late summer to set up for a proper seeding window in the fall. After the second application, you can reseed grasses one week later due to glyphosate’s low residual effects. When using herbicides, always read and follow all label recommendations.

Fall

Fall is all about planning for the future. This is the best time to seed cool-season grasses, re-establish pastures that were killed over the summer and overseed by drilling into existing stands. Overseeding perennials into thin cool-season stands will thicken the stand while overseeding annuals (such as oats, cereal rye or annual ryegrass) into warm-season grass will provide fall and spring grazing.

See Figure 3 for recommended seeding dates.

Grasses are best established using a no-till drill. Seeding rates will vary by species and mixture;

Common Horse Pasture Grasses		
	Cool Season Grasses	Warm Season Grasses
Northern U.S.	Bromegrass Orchardgrass Timothy Perennial Ryegrass Tall Fescue	N/A
Transition Zone	Tall Fescue Orchardgrass Kentucky Bluegrass Perennial Ryegrass	Crabgrass* Bermudagrass
Southern U.S.	Tall Fescue Annual Ryegrass*	Bermudagrass Crabgrass* Bahagrass Dallisgrass
*annuals		

FIGURE 2, GRAPHIC COURTESY KRISTA LEA, UK COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT.

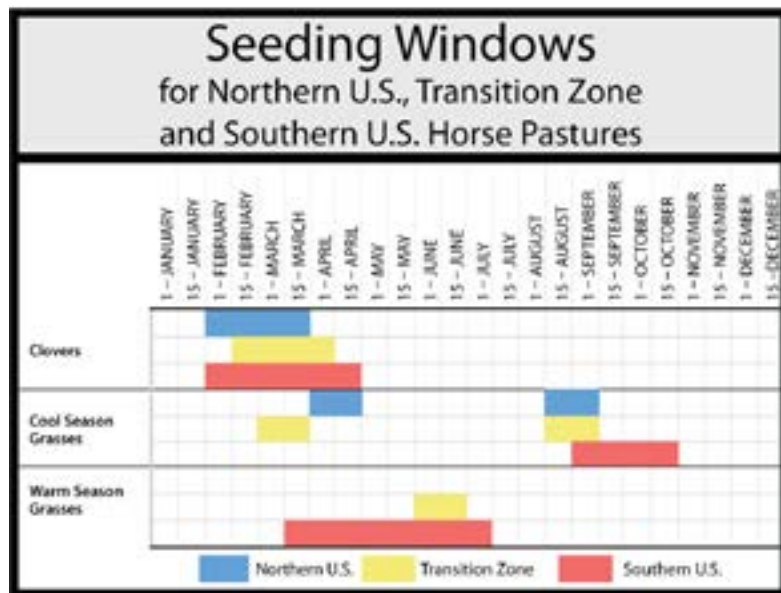


FIGURE 3, GRAPHIC COURTESY KRISTA LEA, UK COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT.

seeding too little can result in thin stands and high weed pressure while seeding too much is a waste of seed (and money).

Nitrogen is the most important nutrient for grass production. Late summer through fall is the best time to fertilize cool-season pastures with nitrogen. This will allow grasses to be productive longer into the winter without the excess production that is common with spring applications. You can split nitrogen applications into two applications (primarily in the transition zone) six weeks apart. Nitrogen applications in late summer are especially important when stockpiling forages for winter.

Do not graze tall fescue or bermudagrass pastures that are being stockpiled in the early fall. These pastures will accumulate forage (aided by nitrogen applications) and can be used when needed in the winter.

Year-Round Practices

Rotational grazing can benefit pastures throughout the grazing season. Horses are spot grazers, meaning that they will repeatedly graze the same location over and over again while ignoring other areas. By rotating horses and clipping pastures after horses are

removed, you can reduce spot grazing's impacts. Rotational grazing is simple: Move horses from one pasture to another and back again every few weeks. Use temporary fencing to divide pastures, if needed.

You can sample soil and apply fertilizer (excluding nitrogen) anytime the weather is conducive. Ideally, sample pasture soil every two to three years, and apply lime and fertilizer based on soil test recommendations. Local county extension agents and agribusinesses are great resources for soil testing recommendations.

A good pasture management strategy will focus on providing and utilizing quality grazing throughout most of the year. Figure 4 illustrates yield distribution for grasses that farm owners can plant in the transition zone. Pastures dominated by cool-season grasses (such as tall fescue and orchardgrass) will be most productive

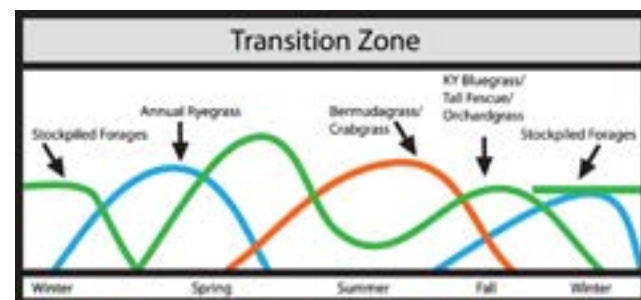


FIGURE 4, GRAPHIC COURTESY KRISTA LEA, UK COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT.

in the spring and the fall. During summer, horses will be grazing warm-season grasses, like crabgrass. Late fall and into winter, feed them stockpiled tall fescue. Seed annual ryegrass in early spring until cool-season perennials become active again. Provide hay if needed in the late winter or peak summer months when forage production does not meet your horses' nutrient requirements.

Weed Control

Unfortunately, weed control is not a once-a-year event. It's highly dependent on the weeds present. Generally, weeds are best controlled in a young, vegetative state; however, they often go unnoticed until they are big and strong. Like grasses, different weeds dominate pastures during certain times of the year. Spring weeds include buttercup, chickweed, purple deadnettle, henbit and yarrow. Summer weeds include pigweed, wild carrot, cocklebur, tall ironweed and ragweed. Fall weeds include plantain and dandelion. The key to successful herbicide control of weeds is applying the correct herbicides for the target weed at the correct time. This means some pastures could require more than one application per year until weed populations decrease. Herbicides that are safe for established grasses are often not safe for new seedlings; you might need to focus on weeds one year and worry about grass establishment the next (or vice versa). Figure 5 contains recommended treatment windows for groups of weeds throughout the various

climate zones. Always follow label instructions when using any herbicide.

Many pasture management practices will also impact weed control. Mowing weeds before they produce seeds can reduce future populations. Maintaining proper fertility will give grasses the best chance to outcompete weeds. Overgrazing pastures will open up bare areas in the pasture, giving weeds the chance to establish and spread.

Determining Your Needs

Not every pasture needs all the management practices discussed here every day. Walk through pastures periodically to help determine how and what to focus your attention on. Contact your local county extension agent or agribusiness representative for assistance and planning of pasture management.

Find more information by visiting the following Forage Extension websites:

Northeast: <http://extension.psu.edu/plants/crops/forages>
 Transition Zone: uky.edu/Ag/Forage/ForagePublications.htm
 South: AlabamaForages.com

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

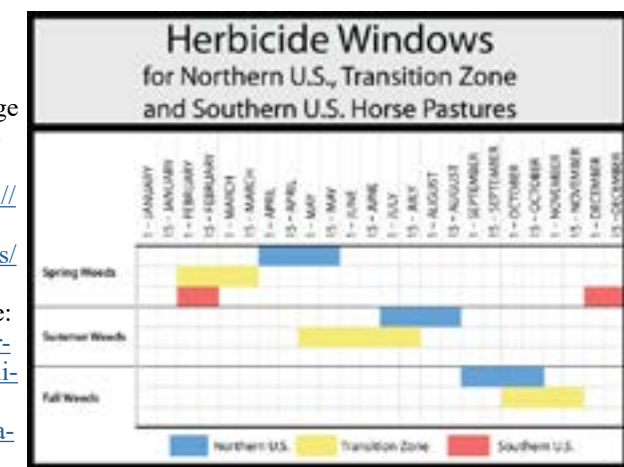


FIGURE 5, GRAPHIC COURTESY KRISTA LEA, UK COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT.

UK IN THE NEWS...

WHAT A HORSE EATS IMPACTS HIS AIR QUALITY

UK graduate student contributes to highlighted research. Source: *Paulick Report and Equus*

Though changing what a horse eats may seem an odd thing to adjust for air quality, research has shown that reducing the amount of protein in a horse's diet can protect his respiratory health. Protein is broken down into nitrogen in the horse's small intestine and then excreted as urea, which becomes ammonia in a horse's stall. Ammonia can irritate nose and lung tissue, causing excess mucus production and respiratory issues like heaves.

Read more about the collaborative work done by researchers, including University of Kentucky Gluck Equine Research Center graduate student Erica Macon, who contributed to this as an undergraduate at UK.

NOCARDIOFORM WHITE PAPER, VIDEO RECORDINGS RELEASED

The University of Kentucky Gluck Equine Research Center has released a white paper and video recordings of its Nocardioform Placentitis Panel from the fall, just in time for the 2021 breeding season. To access that information, visit <https://gluck.ca.uky.edu/nocardioform-sept2020>.