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BLUEGRASS EQUINE DIGEST

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Climate Change's Effects on Kentucky Horse Pastures

Rebecca McCulley, PhD, a grassland ecologist and researcher in the University of Kentucky College of Agriculture's Department of Plant and Soil Sciences, is studying how climate change could affect Kentucky pastures' future composition and what those changes could mean for forage quality.

McCulley's study—which she began in 2008—examines how predicted increase in temperatures, changes in rainfall amounts, and a lengthened growing season might impact pastures.

"We are looking at a higher carbon dioxide world," she said. "There is uncertainty, but it will get warmer. An altered climate will affect what horses and cattle eat. We just don't know how the changes will unfold."

A few years into her study, McCulley already can predict that forage quality won't take much of a hit.

"At this stage, a warm and wet Kentucky will be weedier, and it will have a lot of crabgrass," McCulley said. "But tall fescue and Kentucky bluegrass will still be around. Crabgrass will be more prominent in the future pastures of Kentucky; the real test will be to see if animals respond by eating it."

The project, which is based on pasture representative of a typical Central Kentucky landscape, contains common hay field species: tall fescue, Kentucky bluegrass, red clover, white clover, bermudagrass, crabgrass, and other common weed species. McCulley said her team has neither applied fertilizers, nor have they done any reseeding. Johnsongrass, an invasive weeds species, has been removed by hand. The grasses and legumes were planted in 2008, whereas crabgrass and other weedy

DANNY C. WALLS

Dr. McCulley's team is assessing 20 forage plots' composition after adding heat and/or precipitation.

ARTICLES OF INTEREST

(CLIMATE CHANGE ...)

species were recruited from the seed bank or grew naturally. The project encompasses 20 plots, each receiving one of four different treatments:

- ambient conditions
- added heat
- added precipitation
- added heat and precipitation

For the added precipitation treatment, rain and runoff from an equine barn at the Maine Chance Equine Campus are applied to mimic natural weather patterns, only intensified—researchers apply 30% more precipitation during rainfall events than the long-term historical growing season amount. They use infrared radiant heaters to warm the air, and added heat and precipitation plots 3 Celsius (5.4 Farenheit) degrees above ambient temperatures.

DANNY C. WALLS

Researchers use infrared radiant heaters to warm the air.

McCulley and her team used traditional metrics to test the forage. They gathered "grab samples," which are randomly collected grasses and weeds—whatever is growing in the plot—or enough to fill a large paper bag. The remaining grass is then cut and removed to simulate haying.

The team has measured forage quantity and quality each June, July, and September since 2009.

"There are small shifts in forage quality, but overall the significant changes are in plant species composition," she said. "We are finding that forage quality is okay. Annual crabgrass has become dominant in the added heat treatments. The added heat plots tend to be weedier, with pretty big weeds."

With another two years left in the study, McCulley said that a nitrogen application is possible.

"We're trying to strike a balance between experimental constraints and the real world management scenarios," McCulley said. UK

Karin Pekarchik is an editorial officer in UK's Agricultural Communications Services.

Gluck Center Study on Equine Proliferative Enteropathy

While equine proliferative enteropathy (EPE) is most commonly seen during the fall and early winter, a recent study at the University of Kentucky Gluck Equine Research Center by David Horohov, PhD, William Robert Mills chair and professor at the Gluck Center, and Allen Page, DVM, a doctoral student and Morris Animal Foundation/Pfizer Animal Health fellow at the Gluck Center, revealed that in Central Kentucky exposure to the disease's causative bacterium can continue into March.

Equine proliferative enteropathy is an emerging equine disease that has been reported worldwide. It is caused by *Lawsonia intracellularis*, an obligate, intracellular, Gram-negative bacterium that invades intestinal crypt cells, primarily in the small intestine, and causes thickening of the intestinal lining. This thickening leads to clinical signs such as anorexia, weight loss, fever, lethargy, depression, peripheral/ventral edema (fluid swelling), and sometimes colic and diarrhea. A thickened small intestinal wall observed by a veterinarian via abdominal ultrasound is highly suggestive of EPE. Clinical EPE is typically diagnosed in weanlings and young yearlings, with only a few reports of older horses being affected.

The disease is significant not just because of its

(EPE STUDY ...)

clinical aspects, but also because of its economic impact. A 2008 study by Michele Frazer, DVM, of Hagyard Equine Medical Institute, found that previously affected horses offered for public auction sold for 68% less than unaffected horses by the same sire.

This disease can be a frustrating problem given the lack of definitive diagnostic tests, sporadic occurrences, and its unknown epidemiology.

Diagnosis of EPE revolves around clinical signs, ultrasonographic findings, and evidence of low total protein and albumin (a type of protein in the circulation), as well as results from commercially available diagnostic tests. Detecting low albumin (hypoalbuminemia) might be one of the most effective, rapid, and inexpensive tests for EPE in horses with other compatible clinical signs. Commercially-available tests include fecal polymerase chain reaction (PCR) and serum serology, although definitive EPE diagnosis can only be made after necropsy and relies upon detecting the organism in intestinal lesions.

Most horses with EPE respond well to antimicrobial therapy once diagnosed and treated appropriately, though some horses will ultimately die despite aggressive antimicrobial treatment. Due to the intracellular nature of *L. intracellularis*, most practitioners' antibiotic of choice is a tetracycline-class drug such as oxytetracycline or doxycycline. Some horses will also require supportive therapy, including plasma or fluids, to help support their circulatory system.

Though the epidemiology of EPE is uncertain, researchers believe transmission occurs when horses ingest *L. intracellularis*-contaminated fecal material from wild or domestic animals. Unfortunately, preventive measures for EPE are also poorly defined. While there is interest in developing a vaccine to prevent this disease, little is known regarding horses' immune response to *L. intracellularis*. Recent research has added several important pieces to the EPE puzzle; however, more work is needed before this perplexing disease can be fully understood and prevented. UK

Allen Page, DVM, Morris Animal Foundation/ Pfizer Animal Health fellow at the Gluck Equine Research Center, provided this information.

WEED OF THE MONTH

Common name: Wild Parsnip
Scientific name: *Pastinaca lativa L.*
Life Cycle: Biennial
Origin: Eurasia
Poisonous: Yes (foliage), skin photosensitivity


VIRGINIA TECH WEED ID GUIDE

Wild Parsnip

Wild parsnip is distributed widely across the United States and Canadian provinces and grows frequently along fencerows and roadsides. Depending on location, seeds germinate in the fall or early spring, and flowering occurs from June through July.

Flowers are yellow or yellow with reddish tinge. This erect, growing plant can reach 6 feet in height. The leaves alternate on the stem and are coarsely toothed. Stems are stout and hollow, often with ridges. Roots branch from a tuberous taproot and are edible.

Wild parsnip foliage causes skin photosensitivity and a rash when touched. Humans and horses are sensitive to this species; however, the severity of the reaction varies among individuals.

Wild parsnip is a prolific seed producer, and seeds are the only mechanism of reproduction. Property owners and managers should mow, apply herbicide treatments, or hand weed well before flower production to prevent seed production. Consult your local Cooperative Extension Service personnel (www.csrees.usda.gov/Extension) for herbicidal control in your area. UK

William W. Witt, PhD, a researcher in the department of Plant and Soil Science at the University of Kentucky, provided this information. If there is a weed you would like featured in the newsletter, please contact wwitt@uky.edu.

Hay Producers: Quality Second Cutting Still Likely

Exceptionally wet weather delayed hay cutting this spring, but producers likely still have time to grow and harvest enough hay to last them through the winter.

While many producers were able to make hay during the hot, dry weather the first two weeks of June, alfalfa and alfalfa-mix grass producers were about a month behind in their first cutting. This delay will likely cost them a cutting this year.

A significant amount of fescue and fescue-mix grasses also are still in the fields, but there's a good chance producers can get a quality second cutting, said Tom Keene, hay marketing specialist in the University of Kentucky College of Agriculture.

"For the fescue-type grasses, this isn't so unusual," Keene said. "We call this 'holiday hay' because it usually doesn't get cut until the Fourth of July, but by that time, any nutritive value it had is gone."

ANNE M. EBERHARDT

If hay producers apply nitrogen and receive rain, they have a good chance of a quality second cutting.

Some livestock producers' hay supplies might be low this year due to either recent drought or increasing herd sizes. Those producers need to get as much hay from their pastures as possible to ensure their supplies last through the winter. Those wanting or needing more hay can likely get a good-quality second cutting this year, but they need to replace the nitrogen lost from the first cutting, especially if they didn't apply any this spring.

"As long as we continue to get rain, there's a good chance of getting a quality second cutting of grass pastures, but producers need to apply nitrogen—about 40 pounds per acre—to ensure the ground has the nutrients it needs," Keene said. "If they don't want a second cutting, applying nitrogen to fields now will also give producers good late summer pasture for their animals to graze. The biggest risk associated with the nitrogen application is if it stops raining." UK

Katie Pratt is an agriculture communications specialist at the University of Kentucky.

TOXIN TOPIC SNAKEBITES

The long hot days of summer bring an increased snakebite risk to all animals, including horses. The major venomous snakes in the United States—the pit vipers—include several species of rattlesnakes, copperheads, and water moccasins. Pit vipers are so named because of the heat-detecting holes, or pits, on each side of the snake's head that help it locate prey. Pit vipers can be differentiated from other snakes at a distance by their trianglular heads and narrowing of the neck area just behind the head.

The major types of poisonous snakes in Kentucky are copperheads, cottonmouths, timber rattlesnakes, and pygmy rattlesnakes; there are also some reports of Eastern Diamondback rattlesnakes. Risk of severe, fatal envenomation (poisoning from a venomous bite or sting) is highest with Diamondback rattlers, less with water moccasins, and lowest with copperheads.

(SNAKEBITES ...)

Most snakebites occur when the horse encounters a snake in the pasture or on the trail. Severe bites can occur if a horse steps on a snake and the snake releases all of its venom in one bite as it dies. Snake venom components vary tremendously by snake species, but most venoms contain substances that cause digestion and breakdown of tissues and blood vessels, impair blood clotting, and damage the heart. Some snakes' venom also contain neurotoxins. Ultimately, many factors influence how severe a particular bite will be (i.e., snake species, size, age, recent feeding, number of bites, etc.). Some bites are "dry bites," where little if any venom is injected.

Victim factors can also influence a bite's severity; these factors include size and age of the horse, concurrent medical conditions, drugs the animal might be receiving, and the location of the bite. It is important to understand that while one snakebite incident in one horse might be quite mild and not require treatment, a snakebite involving a different snake, a different horse, or different circumstances might be much more severe and even fatal.

Clinical signs of snakebite in horses can vary widely but generally include pain, swelling at the bite site, one or more puncture wounds, and sometimes sloughing of tissues near the bite site. Some bite wounds might not be readily apparent. Copperhead bites or dry bites with little venom injected often cause only mild signs. Severe bites from more dangerous snake species or larger doses of venom can cause marked pain and swelling, coagulopathy (blood clotting defect) and hemorrhage, cardiac arrhythmias, shock, collapse, and in some cases death. With neurotoxic venoms, paralysis can occur. Horses bitten on the nose can develop swelling of the nasal passages resulting in respiratory distress. Signs of envenomation can occur within minutes of the bite or can be delayed for hours depending on the bite site, venom dose, snake species, and other factors.

Several rattlesnake species inhabit Kentucky.

Seek veterinary care immediately if a horse is bitten by a venomous snake. No first-aid treatments performed by owners in the field have been shown to be particularly helpful for venomous snakebite. In fact, many anecdotal or folk remedies can cause more harm than good. Additionally, suction devices designed specifically for venom removal have not been shown to be beneficial (in pig models of snakebite).The best first-aid is to keep the horse calm and quiet and arrange for immediate veterinary care.

Veterinary treatment will vary depending on bite severity, but might include treatment for shock, fluid therapy, pain medications, wound care, antibiotics, tetanus prophylaxis, and antivenin. Antivenin can be especially helpful in cases of severe envenomation and can decrease the amount of tissue damage and hasten recovery times. Antivenin is dosed according to the estimated amount of venom injected, not the size of the patient, so even one vial of antivenin can help counteract venom toxins in a horse. Cardiac arrhythmias occur in many horses and might require treatment. Horses with severe nasal passage swelling might need treatment to maintain a patent airway and nutritional support if swelling impairs the horse's ability to eat and drink.

Even after horses have recovered from a snakebite's more immediate effects, subsequent complications such as chronic heart failure, kidney damage, and hemolytic anemia (a disease in which the body's immune system attacks and kills its own red blood cells) can sometimes occur. Cardiac failure can occur weeks to months after the bite incident and appears to be more common in horses than in other species. Horses recovering from snakebites should be evaluated every few months for cardiac health, and owners should watch for signs that might suggest cardiac problems (e.g., shortness of breath, slow recovery after exercise, an increased effort to breathe, and general weakness).

A vaccine is available for use in horses to help prevent snakebite complications, but its efficacy is not yet well documented. Contact your veterinarian or a veterinary toxicologist to obtain more information about snakebite and available vaccinations. UK

Cynthia Gaskill, DVM, PhD, a clinical veterinary toxicologist at the University of Kentucky Veterinary Diagnostic Laboratory, provided this information. Contact information: phone 859/257-7912; e-mail cynthia.gaskill@uky.edu.

UKVDL Researcher Evaluates Causative Agents of Abortion

On June 30, in the University of Kentucky Veterinary Diagnostic Laboratory's (UKVDL) new stadium-seat auditorium, Erdal Erol, DVM, MS, PhD, UKVDL head of diagnostic microbiology, gave a lecture titled "Current microbiological methods for equine abortion diagnoses and beyond."

During his talk Erol noted that from 2009 to 2011, he found the most likely infectious causative agents for abortion were bacterial, such as *Escherichia coli*; *Streptococcus zooepidemicus*; *nocardioform actinomycetes*; and *Streptococcus equisimilis*; and viral, such as equine herpesvirus-1 (EHV-1).

Nocardioform-related abortions occur only in the last trimester. A nocardioform-infected placenta might be thick and heavy with distinctive gross lesions that most commonly occur in the body of the placenta at the bifurcation of the uterine horns. The affected placenta is covered by a thick, light brown, tenacious fluid described by some as "peanut butter."

"Nocardioform bacteria were first reported at the UKVDL in 1986, and the UKVDL remains at the center of research and detection for this major causative agent of abortion," Erol said.

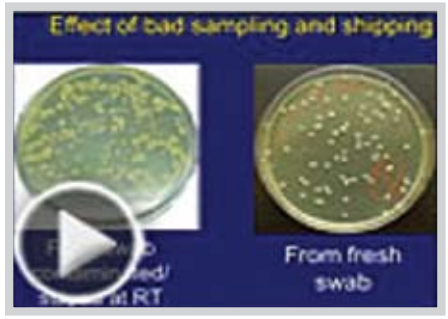
According to Erol, during the 2010-2011 foaling season, the number of confirmed nocardioform cases increased significantly, while the number of leptospirosis (a bacterial disease that can cause abortion in pregnant mares and chronic uveitis) cases fell dramatically. Erol plotted 12 years of retrospective data, which revealed an inverse change from one disease to the other by year, following a pattern of changing weather conditions from dry to humid. Erol's early hypothesis is that abortions caused by nocardioform rise during dry periods, and abortions caused by leptospirosis, a tropical disease, climb during warm and wet seasons. Erol and a research team from UKVDL and the Gluck Equine Research Center are currently investigating this theory.

Another observation from Erol's team is that *S. equisimilis'* resistance to gentamicin and tetracycline (two commonly prescribed antibiotics) is growing. Resistance to these drugs has risen significantly over the past several years.

Erol also discussed EHV-1, which can cause respiratory disease, abortion, and equine herpes myeloencephalopathy, a

PRINCETON FIELD DAY

More than 1,000 people braved high temperatures and excessive heat warnings to attend the University of Kentucky College of Agriculture's all-commodity field day held July 21. Located at the UK Research and Education Center in Princeton, the event featured facility bus tours as well as seminars about topics ranging from beef cattle production to vegetable crops, ornamental crops, and forages. The event also hosted youth activities and included more than 70 exhibitors from across the state. The next Princeton All-Commodity Field Day will be held in July 2013.



To view: www.TheHorse.com/Videos/Horse-Courses.aspx

neurologic form of EHV-1 in horses. This disease requires a laboratory diagnosis. From 2009-2011, the UKVDL used polymerase chain reaction (PCR) to detect 34 EHV-1 cases of fetal abortion, and other laboratory methods such as virus isolation and fluorescent antibody testing confirmed the diagnosis.

Understanding antibody levels, incubation, clinical signs, culture, and serology of abortion causative agents is critical to making a correct diagnosis, Erol said. Major current diagnostic methods include pathological examination, serology assays (monoclonal/polyclonal antibodies, whole lysate/single antigen), culture (usually considered the gold standard), in which the live organism is grown, and PCR, which detects the virus earlier than serology. Veterinarians must collect and submit to the lab fresh and appropriate clinical specimens to maximize the benefit of any tests.

"The specimen should likely yield a causative agent, meaning 'a good swab,' and should be properly taken, stored, and shipped to the lab," Erol explained. "If the swab is stored at room temperature and/or sent without ice packs, there may be too many bacteria present to determine the causative agent." UK

Karin Pekarchik is an editorial officer in UK's Agricultural Communications Services.

UPCOMING EVENTS

August 6
Hats Off Day, Kentucky Horse Park

August 25, 4 p.m.
Department of Veterinary Science Equine Diagnostic Research Seminar Series, Veterinary Diagnostic Laboratory. University of Kentucky's Kristine Urschel, PhD, an assistant professor in Animal and Food Sciences, will speak on "Muscle power: regulation of muscle mass in growing, athletic and aging horses."

PASTURE WEEDS VIDEO WINS AWARD

William W. Witt, PhD, a researcher in the Department of Plant and Soil Sciences at the University of Kentucky, was featured in a video produced by TheHorse.com that won third place at the American Horse Publications' 2011 Annual Awards Competition, held June 18 in San Diego, Calif.

The video, "Pasture Weeds: Most Toxic to Horses," was among 11 entries in the online equine-related video category. In the video Witt discussed poison hemlock, cocklebur, Johnsongrass, and common ragweed, among others as well as the weeds' preferred habitats, what conditions make them more toxic, and how to get rid of them. To view the video, visit www.TheHorse.com/Video.aspx?n=pasture-weeds-most-toxic-to-horses&vID=419. UK