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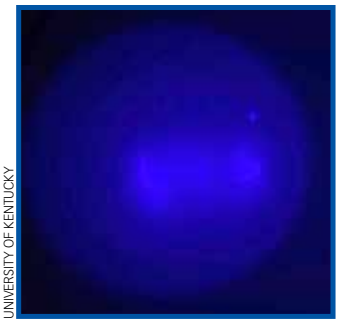
Study Finds Common Equine Parasite Misidentified in Textbooks

A recent study led by Martin Nielsen, DVM, PhD, Dipl. EVPC, ACVM, assistant professor at the University of Kentucky Gluck Equine Research Center, found that all veterinary medicine textbooks have misidentified a common equine parasite.

The large equine roundworm *Parascaris equorum*, commonly referred to as the ascarid, which is known for infecting foals, is actually a different species—*Parascaris univalens*. The research suggests *P. univalens* is the main species now observed in equines. The broader designation *Parascaris* spp. should be primarily used unless cytological characterization (a technique for characterizing chromosomes) has confirmed the species.

"*Parascaris univalens* is really the forgotten parasite," Nielsen said. "It is almost never mentioned in the textbooks, and most people have only heard about one roundworm species infecting equids."



UNIVERSITY OF KENTUCKY

***Parascaris univalens* was given its name because of the single chromosome pair. The image shows the two chromosomes labeled with a fluorescent dye.**

P. univalens was discovered more than 130 years ago. The species only possesses one germ line chromosome pair as opposed to two for *P. equorum*, but the two species are otherwise considered structurally identical.

"We really wanted to find specimens of both species to study and find differences in their DNA," Nielsen said. "The only way to tell them apart is to look at their chromosomes, so we invited a leading expert, Dr. Clara Goday, to the Gluck Equine Research Center to teach us the delicate technique of parasite karyoptyping."

Karyotyping is a technique to study and characterize chromosomes in a sample of cells.

For the study, the team obtained and dissected 30 live worms. They identified all samples as *P. univalens*. Then, they performed the karyotyping technique on ascarid eggs from foal fecal samples. *P. equorum* was not identified among these, whereas *P. univalens* was found in 17 samples, with the remaining eight being inconclusive.

"We were part of another study analyzing numerous *Parascaris* specimens from several different continents, and the conclusion there was that only one species was found," Nielsen said. "We compared genetic information obtained for *P. univalens* in our study with gene codes already published as *P. equorum* and found that they were probably mislabeled."

Others from the UK Gluck Center involved in the study were Jennifer Bellaw, PhD candidate in veterinary science; Eugene Lyons, PhD, professor; and Teri Lear, PhD, associate professor. The group from the UK Gluck Center collaborated with Jianbin Wang, PhD, and Richard Davis, PhD, assistant professor and professor, respectively, from the University of Colorado School of Medicine, and Clara Goday, PhD, at Centro de Investigaciones Biologicas in Spain.

The article was published in the December *Parasitology Research*. UK

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

Articles of Interest

Using Electric Fence to Improve Pastures

Electric fence use in horse pastures varies greatly across breeds, disciplines, and geographic locations. But regardless of where you are located or what you do with your horses, electric fence can be a valuable tool for

Using Electric Fence

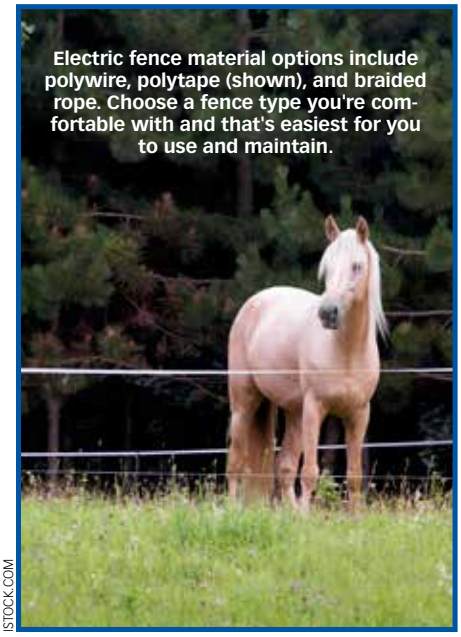
improving your pasture management.

The key to successful electric fence use is proper installation and maintenance. When used properly, temporary electric fence is a safe and economical way for managers to encourage horses to utilize more of the available pastures. This reduces the need for stored forages such as hay, increases the farm's profitability, and reduces the operation's environmental impact.

Benefits to Pastures

Horses are known as spot-grazers. They return to the same areas to graze and will leave other pasture areas untouched. Grasses are more succulent in their short, leafy stage than more mature, taller grasses in a field. Horses might also prefer one area of a pasture because it is closer to the gate, water, shade, or horses in a neighboring pasture. Heavily grazed areas will begin to deteriorate over time; you'll see large patches of weeds or bare soil where healthy grasses were once plentiful. Weeds can greatly reduce pasture productivity and quality; bare soil is likely to wash out during wet periods and might take with it nutrients or pesticides that will end up in surface and ground water. Often you can control spot-grazing by strategically setting up a temporary electric fence.

Installing electric fence in large pastures allows horse owners or farm managers to subdivide the pasture in a low-cost, temporary way. Subdividing allows for rotational grazing. While rotational grazing is often thought to be complicated, it can actually be as simple as rotating horses from one side of the fence back to the other. Allow horses to graze one section of the pasture until the average pasture height is about 3-4 inches and then rotate them to another section. Clip or mow the recently grazed pastures to 3 inches to even out patches of undergrazed grass with more heavily grazed areas. Return horses to this section after they have grazed down other areas to 3 inches or regrowth has reached 6-7 inches. Rotation timing depends on grass species present, pasture size, number of horses, and weather conditions, but it will often be around 21 days on cool-season pastures in the spring and 28-35 days during the summer months.



Electric fence material options include polywire, polytape (shown), and braided rope. Choose a fence type you're comfortable with and that's easiest for you to use and maintain.

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Dividing pastures front and back (instead of side by side) can help managers encourage horses to graze different sections of a pasture that they might not otherwise graze. Always check for toxic weeds or other situations that cause horses to avoid these areas before installing temporary electric fence.

You can also use temporary electric fence to keep horses out of certain areas of a pasture. If you want to apply herbicides to part of a pasture, for instance, fence off that area and allow horses to graze only in nontreated areas. Fencing can also keep horses away from wet areas, noxious weeds, or trees.

What Do You Need?

Keep in mind that temporary electric fence is first a psychological barrier and then a physical one. Use temporary electric fence as an interior fence to further subdivide a pasture, rather than as a perimeter fence. It is best to purchase all hardware from the same manufacturer, as individual parts of the fence will work better together.

Fence material includes polywire, polytape, and braided rope. Horse owners need to select a fence type that they are comfortable with and is easy to use and maintain. The wider 1 ¼-inch tape is more visible, but it tends to catch wind and water, resulting in stretching. The ¾-inch tape is visible and easy to use, as are the braided rope products. If you experience a lot of wind in your area, consider the rope rather than the tape products. How many strands of tape or ropes you use will depend on

MASTHEAD

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The Horse: Your Guide to Equine Health Care

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Using Electric Fence

the horses in the pasture and the horse owners' preferences. One strand can be effective, but in some cases two strands are needed to keep horses where you want them.

Select posts designed to be used with the type of fence you have chosen. Posts can be made of fiberglass, metal, or plastic. Metal (such as t-posts) are not recommended with horses. Plastic posts are light-weight and inexpensive; however, they might not last more than a season unless they are UV-stabilized (meaning the sun will not break down the plastic). UV-stabilized posts are often more expensive, but are usually worth the investment. Fiberglass or composite posts last longer and can be driven in, providing a very stable fence. Wear gloves when handling fiberglass posts.

The charger is the fence's source of electric current. Chargers can plug into a power source, such as in the barn, or can be battery- or solar-operated. Solar chargers might run low after several days of cloudy skies or if the solar panel is otherwise not exposed to the sun. Many chargers will have a combination of power options for backup when needed. The charger's size and type will largely depend on the length and type of fence you plan to install and the availability of power to the area.

For electric fence to work properly, it must be a completed circuit, which requires ground rods. Use galvanized ground rods to reduce rust and corrosion. Ground rods connect to the charger via wire and are buried in the ground. The number and length of the ground rods will again depend on the length, type, and strength of the fence; however, a general rule is three 6-foot rods for dividing a medium-sized pasture. Ground rods do not have to be driven straight into the ground, but can be put in at an angle or even trenched and laid parallel to the soil surface. If trenching, make sure the rod will not be exposed by minor erosion, as this will decrease the fence's effectiveness.

Lightning protection is recommended for electric fence systems, especially more permanent ones. Lightning boxes provide a way for the system to discharge excess energy in the event of a lightning strike. Otherwise, this energy will move back to the charger and can result in charger damage or fire when housed in a structure.

Other necessary items include wire to connect the charger to the fence and ground rods. Be sure the wire is the same type as the fence tape to prevent compatibility issues. Gate handles make it easy to install a simple gate to allow people, animals, and equipment in and out of the area. Make sure the gate is wide enough to allow animals to pass throughout without getting uncomfortably close to the fence, as they might panic and rush through. Electric fence indicators are available to warn others that the fence is electrified, and some will flash when the fence in on to indicate an active current. Fence testers might also be useful for testing the fence's current after it is set up.

Using Electric Fence Safely

Proper installation and maintenance is essential for temporary electric fence to be effective and safe around horses. While a strand of tape is adequate for most adult horses, you might need multiple strands for young, aggressive, or naïve horses. It is important to electrify all strands, so consider your design and needs before you select a charger. Keep fences tight to reduce blowing in the wind and prevent entanglement. Provide ample space when first introducing horses to electric fence. Once horses have a respect for the fence, you might be able to reduce the size of the area or increase the stocking rate.

Accidents often occur when fences are not "hot enough," or do not carry enough charge to completely deter horses from testing a fence. This is why using an appropriate charger for the length and type of fence is essential. While the shock from an electric fence is quick and harmless, it should be strong enough that there is no question in the horse's mind where his boundaries are.

Check fences regularly for sagging or damaged tape or decreased charge. Weeds or grasses that grow up and touch the fence will decrease its charge; therefore, you will need to mow or weed-eat around fences that are standing for the season. As horses become accustomed to the fence and appear to give it a wide birth, remember to keep the fence on and working at all times. UK

>Krista Lea, MS, assistant coordinator of UK's Horse Pasture Evaluation Program, and Bob Coleman, PhD, PAS, UK extension horse specialist, associate professor, director of undergraduate studies in equine science and management, and associate director of UK Ag Equine Programs, provided this information.

The Best Hay, Grass, and Other Forages for Your Horse

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Tom Keene, an agronomy specialist with the University of Kentucky, recently teamed up with Nettie Liburt, PhD, MS, an equine nutritionist based in Long Island, New York, and TheHorse.com to produce a live question-and-answer event on "The Best Hay, Grass, and Other Forages for Your Horse." Watch the archived version here.

Bennett Named UKAg Associate Dean for Research, Experiment Station Director

Rick Bennett, PhD, has been named the new director of the Kentucky Agricultural Experiment Station and associate dean for research at the University of Kentucky College of Agriculture, Food and Environment. Bennett will assume his new duties on June 1.

Bennett comes to UK from the University of Arkansas College of Agricultural, Food and Life Sciences, in Fayetteville, where he is a professor and head of the Department of Plant Pathology. In that position he directed national and state research and extension programs, as well as built partnerships with state and

Bennett

federal agencies. Prior to that, he spent 17 years in various roles with the U.S. Department of Agriculture's Agricultural Research Service, including serving as national program leader for plant health. As such, he managed a large national research program with an annual budget of more than $68 million.

"We are pleased that Dr. Bennett is going to join our administrative team," Dean Nancy Cox said. "Dr. Bennett brings extensive experience based on his leading programs at the USDA Agricultural Research Service and at the University of Arkansas."

As experiment station director, his primary task will be to promote success of the research enterprise in the college. He will also supervise several support programs critical to Kentucky's economy, including the Division of Regulatory Services, UK Veterinary Diagnostic Laboratory, the Kentucky Tobacco Research and Development Center, the Research and Education Center in Princeton, and the Robinson Center for Appalachian Resource Sustainability in Quicksand.

"The University of Kentucky is regarded as a top tier university in agricultural research," Bennett said. "I'm passionate about research, and I am very excited to have this opportunity to join the College of Agriculture, Food and Environment. I'm looking forward to working in a great team environment with Dean Cox, the associate deans, as well as the department chairs and unit leaders. Together they represent the great diversity of research in Kentucky. I'm most excited to learn more about the research-related activities and opportunities for the college's academic departments and all of the off-campus units and centers."

Bennett praised the broad stakeholder support for the experiment station and promised to build on those relationships to ensure sustained growth.

"Dr. Bennett has a reputation for helping others succeed," Cox said. "We are very happy to have him join our college." UK

>Carol Lea Spence is an agricultural communications specialist at the University of Kentucky.

GRAD STUDENT SPOTLIGHT

IGOR CANISSO

From: **Brazil**

Degrees and institute where received:

- **DVM, Federal University of Parana, Brazil**
- **MSc, Federal University of Vicosa, Brazil**
- **Dipl. ACT, Cornell University College of Veterinary Medicine**
- **Dipl. ECAR, Cornell University College of Veterinary Medicine**
- **PhD, Maxwell H. Gluck Equine Research Center, University of Kentucky**

Igor Canisso, DVM, PhD, MSc, Dipl. ACT, ECAR, an assistant professor of equine theriogenology in the department of veterinary clinical medicine at the University of Illinois Urbana Champaign campus, graduated with a PhD in equine reproduction from the UK Maxwell H. Gluck Equine Research Center in 2014.

During his time at the Gluck Center, Canisso was advised by Barry Ball, DVM, PhD, Dipl. ACT, professor and Albert G. Clay Endowed Chair in Equine Reproduction at UK's Gluck Equine Research Center. Canisso's primary research project focused on equine placentitis, which is a major cause of late-term pregnancy loss in broodmares.

Canisso said he chose UK because it has the world's leading program in equine research, and the reproduction lab where he earned his doctoral degree is an excellent facility.

"I obtained my PhD education from the world's best equine reproduction scientists, so it was an easy decision to join the group at the Maxwell H. Gluck Equine Research Center," he said. "Being awarded with a fellowship by the Geoffrey Hughes Foundation through the Department of Veterinary Science certainly gave me the peace of mind that I could complete my graduate work without worrying about stipends."

Canisso said his time studying equine placentitis was rewarding because of the advances that his group has made in the breeding segment of the "horse capital of the world." During his time at the Gluck Center, Canisso had the opportunity to collaborate on research with colleagues in and out of the reproduction laboratory.

"I learned how to become an independent researcher and obtained my PhD training in the center of the horse industry. (It) certainly gave me a differentiated perspective into my career as an equine reproduction scientist and clinician," Canisso said.

Just before his PhD defense, Canisso started as an equine theriogenologist and tenure track faculty member at the University of Illinois. He expressed gratitude for the advancements made in equine science, which could not have happened without funding from the Kentucky Thoroughbred Association and Kentucky Thoroughbred Owners and Breeders Association.

"The experiences, education, and connections with the horse industry acquired while working in the bluegrass has certainly helped me in my new endeavors and journey as a clinician and scientist," Canisso said. 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.

UK Researchers Study *Lawsonia intracellularis* Infection and Risk

Allen Page, PhD, DVM, a former University of Kentucky Gluck Equine Research Center post-doctoral fellow, spoke about *Lawsonia intracellularis*, the bacteria that causes equine proliferative enteropathy (EPE), at the 4th Annual UK Equine Showcase, held Jan. 23 in Lexington, Kentucky.

EPE is a disease of foals that causes hyperplasia, or thickening of the walls of the intestinal tract. *L. intracellularis* mainly affects weanlings and causes anorexia, rapid weight loss, fever, depression, a rough hair coat, throat latch and ventral edema (fluid swelling), colic, and diarrhea.

In most cases if caught early, *L. intracellularis* infection is not fatal; however, it might take a couple of months for affected foals to catch up to others in body condition. In rare instances, veterinarians have diagnosed EPE cases and treated them appropriately, yet the foals die as a result of cell injury or death of cell tissue in the intestinal tract.

"The mares were somehow protecting their foals from exposure to *Lawsonia* in the summer."

Dr. Allen Page

In a recent study, Page and David Horohov, PhD, Jes E. and Clementine M. Schlaikjer Endowed Chair at the Gluck Equine Research Center, Interim Chair of the Department of Veterinary Science and Interim Director of the Gluck Equine Research Center, found that colts were at a significantly higher risk than fillies for developing EPE. However, numerous cases were reported in fillies as well. The study also showed that foals weaned after August were at lower risk for developing EPE than earlier weanlings.

"We found that mares were more at risk for exposure to *Lawsonia* during the summer months than their foals," Page said. "Since most foals were still nursing during this time and likely exposed to the same environments and materials as the mares, we interpreted this to mean that the mares were somehow protecting their foals from exposure to *Lawsonia* during the summer."

There are currently three tests available for *L. intracellularis*—the serum immunoperoxidase monolayer assay (IPMA), the ELISA test, and a fecal PCR test. The IPMA and ELISA both test for antibodies against *Lawsonia*, whereas the PCR test detects the bacteria's DNA in feces.

In most cases, veterinarians administer antimicrobials with intracellular penetration, including oxytetracycline, doxycline, erythromycin, and chloramphenicol concurrently with supportive care such as plasma, replacement fluids, antiulcer medications, and parenteral (intravenous) nutrition. However, each treatment depends on the disease's severity at the time, and in mild cases some veterinarians skip the supportive care.

Page said a vaccine has been approved for use in pigs but currently there is no vaccine labeled for use in horses. UK

>Alexandra Harper, MBA, is the operations and communications coordinator for the UK Ag Equine Programs.

Is HIP an Effective Treatment for *R. equi*?

Fernanda Cesar, DVM, MS, Dipl. ACVIM, PhD candidate at the University of Kentucky Gluck Equine Research Center, discussed using hyperimmune plasma (HIP) to prevent *Rhodococcus equi* in foals at the 6th Annual Kentucky Breeders' Short Course. Other authors on the paper included Macarena Sanz and David Horohov from the Gluck Center.

Rhodococcus equi, a bacterium found worldwide, is the leading cause of pneumonia in foals 1 to 6 months old and has a mortality rate ranging from 1% to 20%. Current antibiotic treatments for infected foals are administered orally and are prolonged and expensive.

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R. equi is the leading cause of pneumonia in foals 1 to 6 months old.

There is no approved vaccine against *R. equi*. Farms with a history of *R. equi* infections often use ultrasound screening and aggressive antimicrobial treatments to detect and treat infected foals. However, this approach has contributed to the appearance of antimicrobial resistance in *R. equi*.

Another preventive approach is to administer HIP to foals at birth—with a second dose at four to eight weeks. The HIP contains antibodies against *R. equi*, which are thought to provide protection to the foal. While the exact mechanism of this protection is unknown, Cesar focused on those antibodies directed against virulence-associated protein A (VapA), an important pathogenic factor of *R. equi*.

Prior HIP field studies produced conflicting results. Studies from the 1990s indicated HIP administration was an effective preventive method, yet current studies from the 2000s showed HIP as being ineffective.

"There are a couple of potential reasons for this (conflicting result)," Cesar said. "The age at which the foals were administered HIP varied, and each study had no definitive diagnosis." Variations between products and individual foals could also play a role.

In the first study, researchers compared foals on Thoroughbred farms in Lexington that were routinely administered HIP to foals on control farms that did not use HIP. They collected and evaluated serum samples for the presence of antibodies to VapA in the foals and their mares. The team compared four different commercial HIP products: Equiplas-REA, PneumomuneRE, ReSolution, and Immuno-Glo. Because none of the companies that produced

Is HIP Effective?

the HIP products funded the study, there was no conflict of interest.

The results showed that the amount of antibodies to VapA each product contained varied. Further, the amount of VapA antibodies in each of the foals that received the HIP varied significantly. In fact, some treated foals had fewer antibodies to VapA than did the untreated foals. This could be due to the product variation in antibody composition and/or natural variations within foals.

In a second study to determine if HIP administration could prevent infection, one group of foals received HIP and a second group received no treatment. Both groups were exposed to *R. equi*, and the researchers monitored their clinical response.

The treated foals showed no adverse reaction to the HIP. While HIP did not prevent foals from becoming infected with *R. equi*, those foals receiving HIP had milder disease and more rapidly resolved their infections.

"(It) appears that while infection was not prevented, natural regression was enhanced," Cesar said.

Take-Home Message

Administering HIP seems to have a positive effect on limiting *R. equi* infections. In previous studies, if a foal did become infected, HIP decreased its duration and severity. HIP is a safe treatment for foals, but it does not have 100% efficacy in preventing infection.

"Further work is needed, in the field and in controlled conditions," Cesar said, "to determine which components of HIP were involved in this protection." UK

>Jackson Wells is an equine science and management undergraduate student and communications intern for UK Ag Equine Programs.

Weed Management in Grass Pastures, Hayfields, & Other Farmstead Sites

Weeds can reduce the quantity and the stand life of desirable forage plants in pastures and hayfields. These unwanted plants are often more aggressive than existing or desired forage species and compete for light, water, and nutrients. Weeds can also diminish the quality and palatability of the forage available for livestock grazing, and certain weed species are potentially poisonous to grazing animals. Additionally, weeds impact a pasture's aesthetic value.

Therefore, property owners might want to initiate weed management strategies that reduce weeds' impact on forage production. But not all weedy plants are detrimental to pastures or hayfields. In fact, some weedy plants provide nutritional value to grazing animals; thus, owners should make prudent management decisions to determine when or if they should initiate weed control.

Table 1. Plants found in Kentucky potentially poisonous to livestock.

Plant	Toxic Parts	Animals Affected
Highest Risk		
Ohio Buckeye Horsechestnut (*Aesculus* spp.)	Young shoots, leaves, mature seed	All animals
Mountain Laurel (*Kalmia latifolia*) Rhododendron (*Rhododendron maxium*)	All parts of plant, particularly the leaves	Cattle, goats, sheep
Red Maple (*Quercus rubra*)	Leaves, especially when fallen, damaged, or wilted	Horses primarily
Wild Black Cherry (*Prunus serotina*)	Wilted leaves	Cattle, goats, sheep most often affected, although horses can also be affected
Yew, Japanese (*Taxus* spp.)	Leaves, bark, wood, seed	Cattle, horse, goats, sheep
Moderate Risk		
Castor Bean (*Ricinus communis*)	All parts of the plant	Horses most susceptible, but all animals can be affected
Larkspur (*Delphinium tricorne*)	Entire plant; young leaves most toxic	Cattle most susceptible; other animals include horses and sheep
Hemp Dogbane (*Apocynum cannabium*)	All parts of the plant, either green or dried in hay	Cattle, horses
Horsetail (*Equisetum arvense*) Scouring Rush (*Equisetum hyemale*)	Aboveground foliage of plant	Horses more susceptible than cattle or sheep
Indian Tobacco (*Lobelia inflata*)	Leaves, stem, fruit	All animals
Johnsongrass (*Sorghum halepense*)	All plant parts, particularly plants drought stressed, wilted, or after frost	Cattle, horses, goats, sheep
Oaks (*Quercus* spp.)	Acorns; young shoots, leaves, sprouts; fall buds	Primary risk to cattle; also to other animals
Perilla Mint (*Perilla frutescens*)	Leaves, stems, seeds	Most often cattle; also other animals
Poison Hemlock (*Conium maculatum*)	Entire plant, particularly roots and seed	All livestock
Occasional Risk		
Black Locust (*Robina pseudoacacia*)	Inner bark, young shoots, leaves, flowers, pods, seed	Horses most susceptible, cattle, sheep
Bracken Fern (*Pteridium latiusculum*)	All stages of plant growth (green or dry)	Sheep less susceptible than cattle and horses
Buttercup (*Ranunculus* spp.)	Stem, leaves; the flowering plant contains more toxin than younger plants	All animals
Kentucky Coffee Tree (*Gymnocladius dioica*)	Leaves, seeds, pulp	Cattle, horses, goats, sheep
Milkweed (*Asclepias* spp.)	All parts of the plant, either consumed green or dried in hay	Cattle, horses, goats, sheep
Jimsonweed (*Datura stramonium*)	The entire plant, both green and dried; seed most toxic	Cattle, horses, sheep, swine
Deadly Nightshade (*Solanum nigrum*)	All parts of the plant	Cattle, horses, goats, sheep, swine
Pigweeds (*Amaranthus* spp.)	Leaves, stem	Cattle, sheep, and other ruminants are most susceptible
Pokeweed (*Phytolacca americana*)	All plant parts, especially roots and seed	Cattle, horses, swine
Common Sneezeweed (*Helenium autumnale*) Bitter Sneezeweed (*Helenium tenuifolium*)	All plant parts, either fresh or cured in hay, particularly bloom stage	Cattle, horses, sheep
White Snakeroot (*Eupatorium rugosum*)	Leaves, stems, green flower heads	Cattle, horses, sheep; other domestic animals
Star-of-Bethlehem (*Ornithogalum umbellatum*)	All parts of the plant, especially bulbs	Cattle, horses, sheep
St. Johnswort (*Hypericum perforatum*)	All plant parts, either fresh or dried hay	Cattle, horses, sheep; goats to a lesser degree

Effect of Weeds on Pasture Yield and Animal Performance

Weedy plants are not usually high yielding and are considered to be low in quality. However, livestock often eat many weeds along with desired forage grasses and legumes. In fact, the dry matter digestibility of several weed species during their early vegetative stage is comparable to seeded forage species. Crude protein levels are adequate for consumption by cattle. But, like many cultivated forage grasses, digestibility and crude protein decline as weeds mature. Thus, the greatest benefits in digestibility and crude protein are obtained from weeds and desirable forage species grazed during their early growth stages.

Other weedy plants are unpalatable compared with the desirable forage species; thus, animals do not normally consume them. For example, livestock selectively graze weeds such as curly dock and tall ironweed to a greater extent than more palatable species such as crabgrass.

Poisonous Plants

One consideration before allowing livestock to graze weed-infested fields is the potential for exposure to poisonous

Table 4. Relative response or susceptibility of herbaceous broadleaf weeds to herbicides.[1]

LIFE CYCLE	Weed Species	Preferred Time to Treat[2]	Cimarron/Ally*	Cimarron Max*	2,4-D	Dicamba (e.g., Banvel, Clarity, Overdrive)	Dicamba + 2,4-D (Weedmaster, etc.)	Crossbow	PastureGard	Redeem R&P	Milestone	Forefront R&P	Glyphosate (spot treatment)
ANNUALS	Chickweed, Common	Nov or Feb-Mar	G	G	P	G	G	F	-	F	G	-	F
	Pennycress, Field	Nov or Feb-Mar	F	G	G	G	G	G	-	-	-	-	F
	Amaranth, Spiny (Pigweed)	May-July	G	G	G	G	G	G	F	F	G	G	G
	Cocklebur, Common	May-July	F	G	G	G	G	G	G	G	G	G	G
	Jimsonweed	May-July	-	G	F	G	G	G	-	G	-	-	G
	Marestail (Horseweed)	Mar-Apr	F	G	G	G	G	G	F	G	G	G	G
	Mint, Perilla	May-July	-	-	G	-	-	G	-	-	P	-	-
	Ragweed, Common	May-July	P	G	G	G	G	G	G	G	G	G	G
	Ragweed, Lanceleaf	May-July	P	G	F	G	G	F	-	-	-	-	G
	Ragweed, Giant	May-July	P	G	G	G	G	G	G	-	-	-	G
	Sumpweed or Marshelder	May-July	F	G	G	F	G	G	F	G	F	G	G
BIENNIALS	Burdock, Common	Feb-Mar	F	G	G	F	G	G	G	G	-	G	G
	Hemlock, Poison	Mar-Apr	F	F	F-G	G	F	G	-	-	-	-	G
	Thistle, Bull	Oct-Nov or Feb-Mar	F	G	G	G	G	G	F	G	G	G	G
	Thistle, Musk (Nodding)	Oct-Nov or Feb-Mar	F	G	G	G	G	G	G	G	G	G	G
	Carrot, Wild	May-June	G	F	G	G	F	F	F	-	F	G	G
	Yellow Rocket	Feb-Mar	F	G	G	G	G	-	-	-	-	-	G
PERENNIALS	Aster spp. (white heath aster)	Aug-Oct	F	F	F	G	F	G	-	-	-	-	G
	Buttercup spp.	Feb-Mar	G	G	G	G	G	G	-	G	F	G	G
	Chicory	Sept-Nov	F	G	F	G	G	F	G	G	-	-	G
	Clover, White	May-Aug	G	G	F	G	G	G	G	G	G	G	G
	Dandelion	Oct-Nov or Mar	G	G	G	G	G	G	F	G	F	G	F
	Dock, Curly	Feb-Apr	G	G	P-F	F	G	G	G	G	G	G	G
	Dogbane, Hemp	May-July	P	F	F	F	F	G	-	P	-	-	F
	Garlic, Wild	Nov or Mar-Apr	G	G	F	F	F	F	-	-	P	-	F
	Goldenrod spp.	June-Aug	P	G	F	G	G	G	G	G	-	-	F
	Horsenettle	Aug-Sept	F	G	P	F	G	F	-	F	G	G	G
	Ironweed, Tall	June-Aug	P	F	P	F	F	G	G	G	G	G	F
	Lespedeza, Sericea	June-July	F	F	P	F	F	F	G	F	F	-	F
	Milkweed, Common	Oct-Nov	P	F	P	F	F	F	-	F	F	-	G
	Plantain, spp.	Oct-Nov or Mar	-	G	F-G	F	F	G	-	G	P	G	G
	Pokeweed, Common	May-July	P	F	F	G	F	F	-	-	F	-	G
	Sorrel, Red (Sheep Sorrel)	Oct-Nov	G	G	P	G	G	G	-	G	-	-	F
	Sowthistle, Perennial	Oct-Nov	F	F	P	G	G	G	-	G	G	G	F
	Thistle, Canada	Oct-Nov	F	F	P	F	F	F	-	G	G	G	F
	Trumpetcreeper	Aug-Sept	P	P	P	F	P	F	F	P	P	P	G
	Yarrow, Common	Mar-Apr	G	G	P	G	F	F	-	-	F	-	F

G = good or excellent; F = fair (suppression or partial control); P = poor; N = none; – = no information.

[1] This table should be used only as guide for comparing the relative effectiveness of herbicides to a particular weed. Depending on the weed size, time of application, and/or use under extreme weather conditions, a herbicide may perform better or worse than indicated in the table.
[2] The preferred time to treat will vary depending on environmental conditions and other factors. Consult herbicide label for recommended plant height or stage of growth.
* Potential to cause temporary stunting and seedhead suppression of tall fescue and timothy (consult label).

Table 5. Relative response or susceptibility of woody plants to herbicides.[1]

		Foliage or Foliar Surface Spray								Thin-Line Basal or Stem Treatment				Cut Stump or Surface				Soil
	MECHANICAL	Cimarron	BrushMaster	2,4-D	Dicamba (Banvel/Clarity)	Crossbow	PastureGard	Remedy	Glyphosate	Dicamba (Banvel/Clarity)	Crossbow	PastureGard	Remedy RTU	Glyphosate	Crossbow	PastureGard	Remedy RTU	Spike 20P
Labeled Sites																		
Pastures/Grazing Land		L	U	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Grass Hayfields		L	U	L	L	L	L	L	L	L	L	L	L	L	L	L	L	U
Fencerow/Pasture Fields		L	U	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Fencerow (not grazed)		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Non-Cropland (not grazed)		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Woody Plants																		
Blackberry	M	G	F	N	F	G	G	G	G	F	G	G	G	G	N	N	G	G
Buckbrush (Coralberry)	M	G	F	F	N	F	N	N	F	N	N	N	N	N	N	N	N	G
Cherry, Wild Black	CT	N	G	N	G	F	F	N	G	N	N	F	F	-	N	F	F	F
Hackberry	CT	-	-	N	N	N	G	N	-	N	N	F	G	-	N	G	G	-
Honeylocust	CT	N	G	N	F	F	G	F	F	N	N	N	F	F	F	G	G	G
Honeysuckle, Bush	CT	-	-	N	F	F	F	F	N	N	F	N	N	F	F	F	F	-
Honeysuckle, Japanese	M	F	G	F	F	G	G	F	G	N	F	N	N	N	N	N	N	G
Kudzu	-	F	G	N	F	F	F	N	G	N	F	N	N	N	N	N	N	G
Locust, Black	CT	N	G	N	F	G	G	G	F	N	N	N	F	-	G	G	F	F
Mulberry	CT	N	N	N	F	F	N	F	F	N	N	N	N	F	N	N	F	G
Multiflora Rose	M	G	G	F	F	G	G	F	G	G	G	G	N	N	N	N	N	F
Osage Orange	CT	N	F	N	N	N	G	F	N	N	N	N	N	F	F	N	N	G
Poison Ivy	-	N	G	F	F	G	F	G	G	N	F	F	N	N	N	N	N	N
Red Cedar, Eastern	C	N	F	N	F	N	N	N	N	N	N	N	F	F	N	N	F	N
Sumac	CT	N	F	F	F	G	G	G	F	N	F	F	F	F	F	G	F	G
Trumpetcreeper	M	N	-	N	F	F	F	N	G	N	F	G	F	N	N	G	N	F

Labeled sites:
L = labeled; U = unapproved application site.
Mechanical controls:
M = mow; C = cut below green growth; CT = cut and treat freshly cut surface.
Herbicide treatment:
G = good control, susceptible or recommended by product label.
F = fair to partial control or growth suppression.
N = not recommended, not listed on the label, or poor performance expected.
- = no information available.
Foliar Surface Spray: Foliage is usually sprayed after plants have fully leafed out and foliage is tender; early summer tends to be the preferred time of year. Ideally trees and brush should be less than 6 feet in height. Apply with a high-volume sprayer at 40 to 80 gallons of spray solution per acre.
Thin-Line Basal: A low volume of herbicide applied as a solid stream across the base of stems (6 to 12 inches above ground line). Basal spray applications consist of using the undiluted product or a 1:1 mixture of the product with a commercial basal oil (consult label). This type of method may not be effective when stem diameter exceeds 3 inches or when plants have thick, rough bark. Treat when stems are dry and rain is not anticipated.
Cut Stump or Surface: Method consists of treating the live tissue beneath the bark. This method includes such treatments as: 1) spraying fresh cuts made in the trunk, 2) immediately treating the outer surface of fresh cut stumps, or 3) injecting with specialized tools. These types of treatments are often used for woody plants that are beyond the brush stage of growth.
Soil Treatment: Method consists of treating soil beneath plant canopy. Herbicide must be leached into the root zone for plant uptake.

plants. The potential for livestock poisonings depends on the poisonous plant's availability and quantity, the stage of plant growth, the time of year, and the kind of animal. Most potentially poisonous plants (but not all) must be consumed in large enough quantities to cause animal death. Many plants have an undesirable taste, and animals do not consume them at levels that are toxic unless other forages are limited during periods of drought or long winter seasons. Several potentially toxic plants found in Kentucky are listed in Table 1.

Weed Control Methods

The way you manage your pasture can have a major impact on the presence of weedy plants. Production practices that result in overgrazing and low fertility levels favor weed emergence, propagation, and growth. Incorporate practices that are more adaptable to the growth of the desirable forage species and less favorable for unwanted plants.

Most weeds do not compete well with a dense stand of desirable forage species. To minimize weedy plants' effects, property owners should manage pastures and hayfields to favor vigorous growth of the desired forage species.

Effective pasture management programs include these practices:

- Maintaining proper soil pH and fertility levels;
- Using controlled grazing practices;
- Mowing at proper time and stage of maturity;
- Allowing new seedlings to become well-established before use; and
- Renovating pastures when needed.

Herbicides can be another useful tool for managing weeds (see tables 4 and 5). Use them where appropriate and when cost-effective.

A program that integrates several different control strategies is generally more successful than relying on only one method. Weeds present at the time of herbicide application might be controlled, but if the forage stand is not vigorous and actively growing, new weed seedlings will soon emerge and occupy the remaining bare areas. Thus, without proper control methods and cultural practices, herbicide use will not be beneficial.

To see the entire publication, please visit www2.ca.uky.edu/agc/pubs/agr/agr172/agr172.pdf. UK

Eastern Tent Caterpillar Egg Hatch Begins in Central Kentucky

Eastern tent caterpillar egg hatch was reported March 23 in Scott County, Kentucky.

Lee Townsend, PhD, University of Kentucky College of Agriculture, Food and Environment extension entomologist, said the tiny larvae will continue to emerge over the next two weeks from eggs laid last summer on flowering wild cherry, cherry, apple, and related trees.

Eastern tent caterpillars spend the winter as tiny, fully developed insects in distinctive egg masses that encircle twigs of wild cherry and related trees. It is one of the first insects to become active in the spring and is well-adapted to survive Kentucky's erratic winter and early spring weather.

"This is a hardy insect, so it is unlikely that our winter temperatures caused much

Eastern Tent Caterpillars


UNIVERSITY OF KENTUCKY

mortality," Townsend said. "Studies have shown that caterpillars in the egg can withstand temperatures down to 31 below zero Fahrenheit."

Eastern tent caterpillar populations have been climbing over the past few years. This trend is likely to continue, he said, producing locally high numbers in some areas. The rise in numbers is normal and mirrors the cyclical aspects of insect populations in general. Eastern tent caterpillar cycles are roughly 10 years, said Townsend. After two or three high years, the numbers usually drop due to disease or natural enemies.

When mature, the large, hairy caterpillars wander from their developmental sites along fencelines. Consumption of large numbers of caterpillars by pregnant mares precipitated staggering foal losses in the mare reproductive loss syndrome (MRLS) outbreak that peaked in 2001. MRLS can cause late-term foal losses, early and late-term fetal losses and weak foals. Studies by UK researchers revealed that horses will inadvertently eat the caterpillars, and the caterpillar hairs embed into the lining of the alimentary tract (which includes the pharynx, esophagus, stomach, small intestine, and colon). Once that protective barrier is breached, normal alimentary tract bacteria can gain access to and reproduce in sites with reduced immunity, such as the fetus and placenta.

Horse owners and farm managers with pregnant mares should begin to monitor fencelines containing wild cherry trees in about two weeks for small tents produced by developing caterpillars.

Farms should move pregnant mares from areas where these trees are abundant to minimize caterpillar exposure. The potential is greatest when the mature tent caterpillars leave trees and wander to find places to pupate and transform to the moth stage.

To get rid of active caterpillars, Townsend recommends pruning them out and destroying the nests as they are seen. Any one of several biorational insecticides registered for use on shade trees can also be used to treat as needed. Apply spot treatments to the tents and/or the foliage around them according to label directions, which vary by product.

Information about assessing trees for egg masses can be found at www2.ca.uky.edu/entomology/entfacts/ef449.asp. UK

>Lee Townsend, PhD, UK College of Agriculture entomologist, and Holly Wiemers, MA, APR, communications director for UK Ag Equine Programs, provided this information.

Annual Career Fair Unites College Students, Equine Industry


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The University of Kentucky Ag Equine Programs hosted its seventh annual UK Equine Career and Opportunity Fair March 3 at Spindletop Hall in Lexington, Kentucky.

The free event provided nearly 250 college students the chance to meet prospective equine industry employers and learn about potential volunteer, internship, and part-time and full-time employment opportunities as well as local boarding and training barns. In addition to visiting the 34 booths from area equine businesses, attendees participated in sessions led by industry professionals.

"The UK Equine Career and Opportunity Fair is the only equine-specific career fair in the country. It's also the only career fair planned by students for students. These elements make it unlike any other event and an excellent opportunity for equine students from across the country and equine businesses to come together for the future of the industry," said Elizabeth LaBonty, lecturer and internship coordinator in UK's Equine Science and Management undergraduate degree program. LaBonty's equine careers class planned and executed the event.

Informational sessions allowed participants to explore career opportunities related to Thoroughbred sales, equine nonprofit organizations, equine therapeutic and rehabilitation, veterinary school, and nonscience equine graduate school options.

Now You Can Follow Us on Twitter, Too

The University of Kentucky College of Agriculture, Food and Environment has several equine-related social media pages with the latest news and events information.

The UK Ag Equine Programs recently joined Twitter. Follow us at @UKAgEquine.

The UK Maxwell H. Gluck Equine Research Center is also on Twitter at @UKGluckCenter.

Got Facebook? Like these pages administered by us:

University of Kentucky Ag Equine Programs: UK Ag Equine Programs is an overarching framework for all things equine at the University of Kentucky, including the undergraduate degree program, equine-related student organizations, equine research, and outreach activities.

University of Kentucky Maxwell H. Gluck Equine Research Center: The mission of the Gluck Center is scientific discovery, education and dissemination of knowledge for the benefit of the health and well-being of horses.

Twitter

University of Kentucky Horse Pasture Evaluation Program: The University of Kentucky Horse Pasture Evaluation Program is a service program offered to horse farms in Kentucky with the goal of overall improved pasture management. Regardless of breed or discipline, the programs goals are to: provide detailed pasture management recommendation to horse farm owners and managers; help improve pastureland to increase quality and quantity of pasture as a feed source and reduce the need for stored feeds such as hay and grain; and assess the potential risk of fescue toxicity of individual pastures to pregnant broodmares.

Kentucky Equine Networking Association (created by the Kentucky Horse Council and University of Kentucky): The mission of the Kentucky Equine Networking Association (KENA) is to provide an educational and social venue for equine professionals and other horse enthusiasts from all disciplines to share ideas and business strategies, and obtain current knowledge on horse and farm management with the principal objective of enhancing individual horse ownership and the horse industry at large.

Saddle Up SAFELY: Saddle Up SAFELY is a rider safety awareness program sponsored by UK HealthCare, UK College of Agriculture, Food and Environment and many community organizations. It aims to make a great sport safer though education about safe riding and horse handling practices. UK

UPCOMING EVENTS

March 31, 6 p.m.
Horse College, Wolfe County Extension Service

UK Researcher Receives Grayson-Jockey Club Research Foundation Funding

The Grayson-Jockey Club Research Foundation board of directors has approved a budget of $1,100,500 to fund equine research in 2015.

The budget will fund 10 new projects, seven second-year projects, and two Career Development Awards to encourage young scientists. Also, the budget allows for a special call for more research which will be announced at a later date. The 2015 funding brings the foundation's totals since 1983 to 322 projects at 41 universities for an aggregate of $22 million.

"Thanks to the generosity of our donors, we are able to fund every one of the projects that our Research Advisory Committee evaluated as qualifying for support," said Edward L. Bowen, president of the foundation. "The fact that we also can reach out with a special call is a true bonus for us and, more importantly, for the horse."

Among the projects that will take place in 2015 is a two-year grant to Thomas Chambers, PhD, of the University of Kentucky's Gluck Equine Research Center for his study, "Inhibition of Type-I Interferon Response by EHV-1."

Additional details on all the projects are available at grayson-jockeyclub.org. The Grayson-Jockey Club Research Foundation is a leading source of private funding for equine medical research that benefits all breeds of horses. UK

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