

Agriculture and Natural Resources

July 2023

A Message From Your ANR Agent:

Folks,

We are trying a few new things with our newsletters. Am trying to send more complete information on the topics and use more traditional Research Based info provided by UK. Please look through the different topics and see if they are providing the kind of information you wish to receive. Also feel free to give me topics to work on to provide you information you can use. We will normally provide information on current/timely topics and adjust them as we have questions from the farmers and public.

Good luck in all you do and give us topics to research,

Suzanne



Suzanne Stumbo

Pike County ANR Agent

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"Opportunities are disguised as hard work...that's why so few people recognize them"

-unknown



University of Kentucky
College of Agriculture,
Food and Environment
Cooperative Extension Service

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HOW MANY POUNDS
OF HAY DOES AN
AVERAGE HORSE
NEED PER DAY?

A 1,200-pound horse needs about 24 pounds of hay per day. Feeding horses is expensive. Producers should plan for how much hay they may need this winter, while growing conditions are ideal.

 Cooperative
Extension Service

Selecting Hay for Your Horse: Separating the Facts from the Fiction

Horse people are often described as picky, fussy or difficult when it comes to hay selection. This description is not surprising because many horses are either very valuable or viewed as part of the family.

It is often a lack of knowledge about selecting quality hay that gives horse owners a bad name and forces them to pay more for hay than their neighbors with other types of livestock. Myths develop because of a piece of truth that becomes inflated and held as absolute truth without justification. To improve our knowledge of hay selection, here are a few common myths about hay, how these myths came to be accepted and, finally, “the truth.”

Note: For the purposes of this article, “high quality hay” refers to hay with a high nutritive value.

Myth: Second cutting hay is always the best cutting.

How it came about:

The number one factor that determines hay quality is stage of maturity at harvest. Cool season grasses such as orchardgrass and timothy will produce a seedhead in the spring, often just in time for the first cutting. For the hay producer, this means an increase in yield and therefore more bales can be harvested and sold. However, this also means that fiber is elevated in the crop, therefore reducing quality. Because seedheads are only produced one time per year in cool season grasses, subsequent cuttings do not contain them and second or later cuttings will be generally less fibrous as a result. Second cuttings tend to cure more quickly and are less likely to experience rain damage; both contribute to higher quality relative to first cutting.

Truth:

First cutting hay can be high quality if cut early and second cutting can be low quality if it cut late. Stage of maturity and other management factors affect hay quality at harvest. High quality (or low quality) hay can be harvested from late spring to late fall if weather and management conditions are right. Quality should never be assessed based on cutting number, but on a laboratory-performed analysis.

Myth: Horses require higher quality hay than cattle.

How it came about:

Some horses, especially those with high nutrient requirements, do require higher quality hay than cattle. Horses and cattle have very different digestive tracts. Cattle are ruminants and are able to breakdown fiber very efficiently, whereas horses are monogastrics with a functional large intestine (hindgut fermenters) and are less efficient at fiber digestion. Therefore, cattle can perform well on lower quality hay that horses cannot digest well.



Truth:

Individual needs of the animal should dictate the quality of hay provided. An easy-keeping Quarter Horse in light work does not need the same quality of hay as a Thoroughbred at the peak of its racing career. Similarly, an open Angus cow does not need the same quality of hay that a high producing dairy Holstein needs at the peak of lactation. Consider the current body condition, level of work and pasture availability of your horse. Then choose hay that will meet the needs of your horse without excess based on a hay test.

Myth:

(Fill in the blank) is the best type of hay.

How it came about:

Statements such as this often come from horse owners that have moved from one area of the country (or world) to another and are not accustomed to the local hay. Different forages are adapted to different soils and climate conditions, so the most common hays available for horses vary among regions.

Truth:

Hay quality is not about the forage species or even the variety. Forage species used for hay will fall into one of two categories: grasses or legumes. Grasses can include orchardgrass, Kentucky bluegrass, tall fescue, bermudagrass, timothy, teff and smooth brome grass. Legumes include alfalfa, red and white clover, lespedeza and birdsfoot trefoil. When managed and harvested correctly, legumes will be higher in quality than grasses; however there will be little difference between different grasses or between different legumes when all other factors are held constant. Buying quality, local hay will likely save money due to reduced transportation costs. Make sure to address any concerns with a specific grass or legume species, such as endophyte infected tall fescue. If you are concerned about feeding a certain species of hay, ask your local county extension agent or equine nutritionist about it.



Myth: Forage stored as round hay bales or as silage contain diseases such as botulism and should not be fed to horses.

How it came about:

The botulism bacterium prefers moist conditions and is commonly found in the soil, in stream sediments and in the intestinal tracts of fish and mammals. Silage (haylage) by definition is stored with higher moisture than hay, and when not properly handled, can allow the botulism bacterium to flourish. Hay that is conserved in large round bales is usually baled at a similar (often lower) moisture content as small square bales and thus is different than haylage. However, if round hay bales are stored outside, they can get wet from rain, encouraging the growth of bacteria and mold.

Truth:

Proper storage, handling and feeding of round hay bales will minimize the risk of botulism in horses. Round hay bales should be covered when stored and fed using a hay feeder to reduce contamination from trampling and urination. Round bales that show clear signs of mold should not be fed to horses. Feeding silage to horses is much more common in other countries than in the U.S. Silage should be put up at the proper moisture content for the style of storage, kept airtight until feeding and fed quickly to reduce the risk of botulism. Silage should always be tested for forage quality before feeding. In botulism prone areas, a veterinarian should be consulted about the use of silage and the inclusion of a vaccination against botulism to protect horses.

Myth: Don't feed hay that has been rained on.

How it came about:

Rain negatively affects hay in a variety of ways:
Rain on recently cut hay can prolong plant respiration and reduce energy content.
Rain on legumes will cause leaves to separate from the stems (called leaf shatter) and therefore remove the more nutritious portion of the plant. Fibrous stems will then be more concentrated in the final product, causing a decrease in quality.
Rain will also cause leaching of sugar and other carbohydrates, proteins and minerals.
Heavy rain can splash soil up onto curing hay, which can increase dustiness and rapidity of molding.

Truth:

Rained on hay can be acceptable quality. While rain usually negatively affects hay, to what degree depends on several factors, including what type of hay is being harvested, how much/how intense the rain fell, stage of curing when it rained and what the producer has done to counteract these negative effects. For example, if light rain occurs within a day of cutting, it has very little effect on hay quality. All hay, especially material that has been rained on should be tested for quality and inspected for mold or dustiness before use.

Myth: Hay should be stored for six weeks before feeding.

How it came about:

This myth likely came about from hay testing. After hay is stored in a barn, it will continue to cure for four to eight weeks. During this curing period, the quality of the hay can change slightly.



Truth:

Hay can be fed at any time after harvesting. Hay should not be tested until it has been stored for six to eight weeks to increase the accuracy of the hay test. While feeding hay sooner will not be harmful to horses, it will be difficult to balance the ration because the quality of the hay is unknown.

Myth: Green is good; brown is bad.

How it came about:

Often, hay that has been harvested too late or mishandled will lose its green color due to processes such as heating and bleaching. Green hay is less likely to have gone through these processes and more likely to be of quality.

Truth:

A hay test is the only way to truly evaluate quality. No quality factors directly affect color or vice versa. Therefore, color is an inconsistent factor to evaluate the quality of hay.

Myth: Feeding hay causes a large, distended digestive tract, known as a hay belly.

How it came about:

Hay belly usually results when malnourished horses are provided large quantities of low quality, high fiber hay. The horse will usually be thin over the neck, withers, ribs and hindquarters; however the belly will appear large because the horse is consuming large amounts of hay.

Truth:

A balanced ration that includes quality pasture or hay will maintain a horse at an ideal condition without excessive gut fill.

It is important to remember that horses evolved consuming forage, and whether in the form of pasture or hay, is an important component in the equine diet. Choosing hay for your horse will depend on your horse's current condition, work level, pasture availability and the logistics of management on your farm. Hay should always be inspected and found to be free from contaminants such as weeds, insects, mold, dust and other foreign material. The nutritional value of the hay should also be evaluated prior to feeding so that a ration can be formulated that will meet the needs of your particular horse.

For more information, see the following publications from the University of Kentucky:

- Botulism: A Deadly Disease that can Affect Your Horse
- Choosing Hay for Horses
- Minimizing Losses in Hay Storage and Feeding
- Understanding Forage Quality
- Alfalfa: High-Quality Hay for Horses



Dealing with Chiggers in the Landscape

by Jonathan L. Larson, Extension Entomologist
University of Kentucky College of Agriculture

Fast Facts

- Chiggers are immature mites that feed on the skin of animals and induce an aggravating rash with an intense itchy feeling.
- They are most commonly encountered in overgrown areas but can live in yards and near parks and camps where they will spoil a nice weekend outside.
- Skin based repellents for ticks and mosquitoes can also repel chiggers. DEET is the best option for your skin, permethrin is an insecticide you can apply to clothing.
- Over the counter medications, like hydrocortisone, may help, though the itchy symptoms will likely persist for about 10-14 days.

Pest Description, Feeding Style, and Symptoms

Chiggers are barely visible to the naked eye. You likely won't see them in the landscape or when they are on your body to feed. If you were to look at one under a microscope or powerful magnifying glass, you would notice that they have six legs, and they are usually reddish in color.

Chiggers are parasites that feed on digested skin cells. They are the immature larval stage of a predatory mite. When chiggers are on their host, they will insert a tube-like mouthpart into the skin. Then, they will pump in their "saliva" which will dissolve the nearby skin cells. After this, they will slurp up the resulting skin slurry. This can happen over the course of 2-4 days. It is important to note that chiggers are external parasites. The mite doesn't burrow into the skin.

The effects of chigger feeding are much more noticeable than the chigger itself. Bites are usually located in areas with thinner skin, or an area being constricted by clothing. Common bite sites are the ankles, behind knees, the groin area, the waistband area, in armpits, and around bra lines. The effects of being bitten may not appear for 12-24 hours after exposure to the chiggers. The area bitten can be inflamed and hardened, with a reddish hue. The center may have a red dot and be sunken, they could be red and slightly raised, they may also develop a large pustule that can pop like a blister. Different individuals may react differently to bites from parasites.

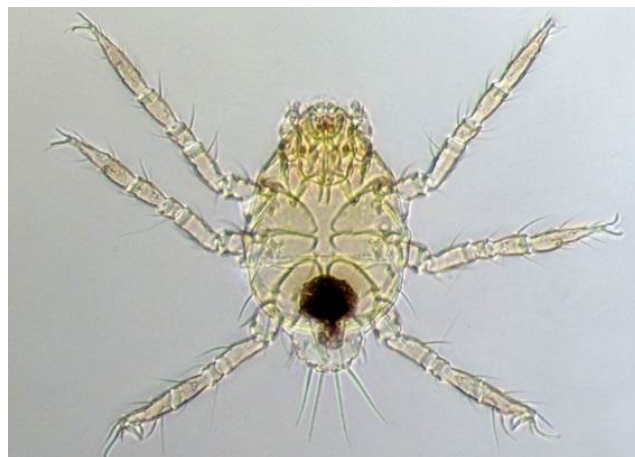


Figure 1: As immature mites, chiggers only have six legs. They are almost invisible to the naked eye; this image is highly magnified to show their body plan off.

Photo by Jim Kalisch, UNL Entomology

Life Cycle in Kentucky

Chiggers overwinter as adults, hiding in the soil until spring. When temperatures begin to rise, the soil temperature will be around 60 °F, they will emerge and mate. The eggs will then be laid in the soil as well, usually in habitats that are overgrown. After the eggs hatch, the chiggers that attack humans and pets will then crawl to the ends of blades of grass or tips of other plants and wait for a host. After feeding, this parasitic stage will fall off of the host and molt to the next stage. In Kentucky, there can be multiple generations of chiggers with bites possibly occurring over the entire growing season but peaks in spring and late summer.



Figure 2: Chiggers are external parasites only; they do not burrow into your skin and live there. The orange arrow in this image is pointing to a chigger feeding on a person’s leg. Photo by Jim Kalisch, UNL Entomology

How to Protect Yourself

To avoid chigger habitats, you can try to avoid entering unmown or overgrown areas and stick to managed trails. Wearing long pants, that are tucked into socks or shoes, and long sleeves can reduce the ability of chiggers to reach your skin. When you come in from outdoor activities, even short ones like weeding, you can also dislodge chiggers by wiping your legs down with a dry towel or taking a quick shower and scrubbing your lower appendages.

Using insect repellents on your skin can also protect you from chiggers. Skin based repellents include DEET, picaridin, IR-3535, and oil of lemon eucalyptus. These also help to repel ticks and mosquitoes. Depending on the percentage of the active ingredient in the product and the amount of time you plan to spend outside, you may need to make multiple applications to ensure protection.

Beyond skin-based repellents, if you will be spending extended periods of time in chigger habitat (i.e., working outside, camping, hunting, etc.) you can treat your clothing with permethrin. This is a true insecticide, so it shouldn’t be applied to the skin but once it is dry on clothing, it will kill chiggers (as well as ticks and other pests) when they climb onto your clothing.

If you do get chigger bites, they can be treated with over-the-counter medication (such as hydrocortisone, calamine lotion, etc.) or you may want to consult with a medical professional about prescriptions to help with relief.



Figure 3: The ankles, knees, groins, waists, and armpits are all chigger bit hotspots. People can be bitten by a few to many chiggers and react in different ways. Some develop dots like we see here, others may end up with pustule-like bites. Photo by Jim Kalisch, UNL Entomology

Treating Chigger Habitats

Long-term solutions to chiggers include brush removal, mowing, and landscape management to cut down on suitable habitats. Increasing light penetration and reducing humidity in given areas (by opening them up through plant removal) can reduce chigger attraction to an area. It also reduces habitat for other potential chigger hosts, meaning there could be fewer chiggers in that area.

Insecticides won't provide long-term control over chiggers but can help to reduce populations quickly so you can get back outside and work or enjoy your landscape. Hot spot treatments with products containing bifenthrin, permethrin, cyhalothrin, or carbaryl would provide 1-2 weeks of control (depending on the product used and the weather).

Follow label directions but treat the afflicted vegetation up to a height of about three feet. Treating in April or May would provide effective timing, in serious infestations there may need to be a follow up application in June.

CAUTION! Pesticide recommendations in this publication are registered for use in Kentucky, USA ONLY! The use of some products may not be legal in your state or country. Please check with your local county agent or regulatory official before using any pesticide mentioned in this publication.

Of course, **ALWAYS READ AND FOLLOW LABEL DIRECTIONS FOR SAFE USE OF ANY PESTICIDE!**

The Fall Garden

Gardening doesn't have to end with your summer-grown crops since some vegetables are suitable for late summer planting. Plan to follow your spring and summer gardens with a fall garden so that you can have fresh produce well into the winter.

Plant crops according to your planting plan, grouping plants to be sure short ones are not shaded by tall ones. To encourage good germination, fill each seed furrow with water and let it soak in. Keep the soil moist until seeds have germinated.

Fall vegetables are harvested after early September. They consist of two types:

1. the last succession plantings of warm-season crops, such as corn and bush beans,
2. cool-season crops which grow well during the cool fall days and withstand frost.

Note that cool nights slow growth, so crops take longer to mature in the fall (and spring) than in the summer. Keep this slower pace in mind when you check seed catalogs for the average days to maturity. Some of the best quality vegetables are produced during fall's warm days and cool nights. These environmental conditions add sugar to sweet corn and cole crops, and crispness to carrots.

The vegetables in Table 13 can be successfully seeded or transplanted for fall harvest. Often, you will want several seeding dates to extend the harvest over a longer time. This table gives the latest dates for either seeding or transplanting as indicated.

Extending the Growing Season

Typical planting dates for vegetables in Kentucky (Table 14) as well as season production times (earliest and latest planting dates, Table 15) provide a guide for conventional production, however there are methods for extending production beyond the traditional season. Polyethylene row covers have been used for a long time to help vegetables grow and ripen early in the spring. However, Kentucky's springs are often too warm to benefit much from early season row covers. During the fall, on the other hand, these covers might prove useful to gardeners wishing to extend the harvest of frost-sensitive crops (tomatoes, peppers, cucumbers). The objective of using a row cover is to trap heat from the soil and protect the crop from cold night temperatures which might deform fruit or kill the plant. Many times in Kentucky, a period of mild weather will follow the first killing frost. If you protect frost-sensitive vegetables at critical times in the fall you could extend the harvest season by several weeks. However, the tall stature of some of these crops (tomatoes) makes it more difficult to protect them using row covers. A second use of season extension might be to grow certain frost tolerant vegetables during the winter months. Vegetables like carrots, turnips, leeks, cabbage, lettuce, spinach, kale, and other leafy greens, are generally planted in the spring garden where they tolerate frost and freezing conditions. These vegetable are fairly low growing which would allow them to mature under row covers and their proximity to the ground helps protect them during extremely cold weather. Using solid plastic covering (low tunnels, see below), these greens may grow well into winter or even all winter long when temperature are not extreme (subzero F). But the nature of the low tunnel will require the growing beds to be ventilated during sunny conditions.

Table 13. Crops for the fall garden.

Vegetable	Date of Planting	Seeds	Transplants	Days to Maturity ¹	Date of Harvest
Beets	Jul - mid-Aug	x		70 - 75	Oct
Bibb lettuce	Jul - Aug	x	x	50 - 60	Sep - Oct
Broccoli	Jul - Aug		x	60 - 80	Sep - Nov
Brussels sprouts	Jun - Jul		x	70 - 80	Oct - Nov
Cabbage	late Jun - early Aug		x	60 - 70	Sep - Nov
Carrots	Jul - Aug	x		80 - 90	Nov
Cauliflower	late Jun - early Aug		x	70 - 80	Sep - Nov
Chinese cabbage	Jul - Aug	x	x	50 - 70	Sep - Nov
Collards	Jul - Aug	x		80 - 90	Oct - Nov
Endive	Jul - Aug	x	x	70 - 80	Sep - Nov
Green beans, bush	Jul - mid-Aug	x		60 - 65	Sep
Kale	Jul - Aug	x	x	70 - 80	Sep - Nov
Kohlrabi	Jul - Aug	x		60 - 70	Sep - Nov
Leaf lettuce	Jul - Aug - Sep	x	x	40 - 60	Sep - Oct
Mustard greens	Jul - Aug	x		50 - 60	Sep - Oct
Parsnips	June	x		90 - 100	Nov
Potatoes	mid-Jun	x		90 - 100	Oct
Radishes	Sep	x		30 - 40	Oct
Rutabaga	July - mid-Aug	x		80 - 90	Oct - Nov
Snow Peas	Aug	x		50 - 70	Oct
Spinach	Aug - Sep	x		50 - 60	Aug - Sep
Sweet corn	Jul	x		70 - 80	Sep
Turnips	Jul - Aug	x		50 - 60	Sep - Nov
Turnip greens	Jul - Aug	x		50 - 60	Sep - Nov

¹ Due to cool temperatures in the fall, a long time will be needed for certain crops to mature.



Table 14. Vegetable gardener's calendar with planting dates for Western, Central, and Eastern Kentucky¹

Western Ky	Central Ky	Eastern Ky	Planting Method ²	Crop
Jan. 15	Jan. 22	Jan. 29	I	Onions
Feb. 1	Feb. 8	Feb. 15	I	Brussels sprouts
Feb. 15	Feb. 22	Mar. 1	I	Cole crops (Broccoli, cabbage, cauliflower, kohlrabi), lettuce, Chinese cabbage
Mar. 1	Mar. 8	Mar. 15	O	Spinach, mustard, beets, peas, edible podded peas
Mar. 15	Mar. 15	Mar. 22	M	Cabbage, kohlrabi
			O	Asparagus and rhubarb (crowns), beets, carrots, collards, kale, mustard, spinach, peas, edible pod-ded peas, early potato seed pieces, radishes, turnips, green onions, onion sets, endive
			I	Peppers, tomatoes, eggplant, sweet potato slips. Dig and divide any 4 year old rhubarb plants. Fertilize asparagus and rhubarb with 1 lb 5 10 10 per 100 sq ft.
Apr. 1	Apr. 8	Apr. 15	M	Broccoli, cauliflower, collards, lettuce, Chinese cabbage, Swiss chard, onions from seeds
			O	Mustard, spinach, radishes, lettuce, Swiss chard
Apr. 5	Apr. 12	Apr. 19	I	Muskmelons, watermelons, squash
			O	Sweet corn, beets, carrots, mustard, spinach, radishes, lettuce
May 1	May 8	May 15	O	Sweet corn, mustard, radishes, lettuce
May 7	May 15	May 22	O	Green beans, lima beans
			M	Tomatoes, muskmelons, watermelons, squash
June 1	June 8	June 15	O	Sweet corn
			M	Sweet potatoes
June 15	June 22	June 29	O	Sweet corn, late potatoes, summer squash, bush beans, lettuce, parsnips, beets, carrots
July 1	July 8	July 15	O	Sweet corn (early maturing variety), carrots, beets
July 10	July 18	July 25	O	Sow seeds of fall cole crops in a nursery area
July 15	July 22	July 29	O	Sweet corn (early maturing variety), kale, mustard, turnips, summer squash
Aug. 1	Aug. 8	Aug. 15	M	Transplant fall cole crops to permanent location between now and Aug. 15
			O	Peas, edible podded peas, bush beans, radishes, beets, mustard. Divide old rhubarb or plant crowns if not done in spring.
Aug. 15	Aug. 22	Aug. 29	O	Radishes, spinach, turnips, turnip greens, beets, mustard, lettuce, endive
Sept. 1	Sept. 8	Sept. 15	O	Radishes, spinach, mustard
Sept. 15	Sept. 22	Sept. 29	O	Radishes, mustard, turnips, turnip greens
Oct. 1	Oct. 8	Oct. 15	O	Radishes
Oct. 15	Oct. 22	Oct. 29	O	Sow sets of Egyptian tree or multiplier onions. Harvest carrots before heavy freeze.
Nov. 1	Nov. 8	Nov. 15	O	Dig parsnips and store at 32-40°F, or mulch parsnips heavily in the ground

¹ Planting dates are approximate, consult your local weather conditions and adjust planting dates accordingly.

² I: Start seeds indoors; M: Move transplants to garden; O: Start seeds outdoors

Gardeners have a choice of self-ventilating covers (slitted or perforated), low tunnel covers, or floating row covers. The slitted and perforated types as well as the plastic used for low tunnels are available in clear and opaque polyethylene and require wire hoops or PVC pipe for support. To construct such tunnels after planting, push hoops (made from no. 9 galvanized wire or PVC pipe) into the ground, and spaced 5 feet apart over the row (Figure 7). Then when frost or freeze is predicted, cover them with clear polyethylene. Bury the edges of the plastic in the ground. For floating row covers, simply place the fabric directly over the crop and secure at the edges. The slitted sides of perforated covers and the loose nature of floating row covers allow needed ventilation on sunny days to prevent overheating. However these season extension devices provide less protection from cold at night. Low tunnels made with solid plastic offers the best protection at night but must be ventilated by loosening the sides or ends during sunny days. Without ventilation, temperatures under the cover may quickly reach crop-damaging levels on sunny days. Raised bed gardens are generally easily adapted to low tunnel culture.

Figure 7. Slitted row cover.

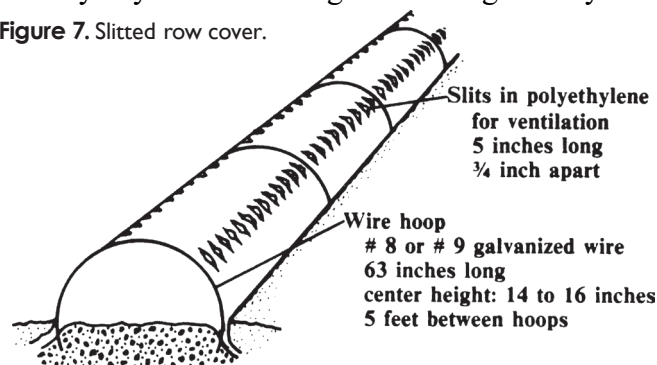
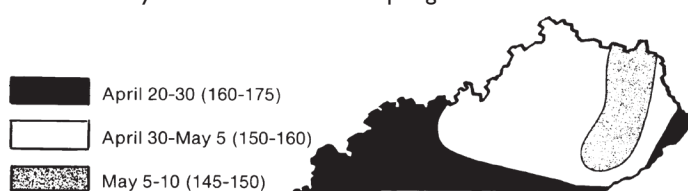


Figure 8. Average date of last killing frost (36°F) in spring, plus average number of days between last frost in spring and first frost in fall.



Earliest and latest planting dates in the garden in Kentucky

Table 15. Earliest and latest planting dates in the garden in Kentucky. (If producing your own transplants, begin two to 12 weeks earlier than these listed dates. See Table 6.)

Crops	Earliest Safe Planting Date			Latest Safe Planting Date ¹		
	Western	Central	Eastern	Eastern	Central	Western
Asparagus (crowns)	Mar 10	Mar 15	Mar 20	(Spring only)		
Beans (snap)	Apr 10	Apr 25	May 1	July 15	July 25	Aug 1
Beans (lima)	Apr 15	May 1	May 10	June 15	June 20	July 1
Beets	Mar 10	Mar 15	Mar 20	Aug 1	Aug 10	Aug 15
Broccoli (plants)	Mar 30	Apr 5	Apr 10	July 15	Aug 1	Aug 15
B. Sprouts (plants)	Mar 30	Apr 5	Apr 10	July 1	July 15	Aug 1
Cabbage	Mar 15	Mar 25	Apr 1	July 1	July 15	Aug 1
Carrots	Mar 10	Mar 20	Apr 1	July 1	July 15	Aug 1
Cauliflower (plants)	Mar 30	Apr 5	Apr 10	July 15	July 20	Aug 5
Celery	Apr 1	Apr 5	Apr 10	June 15	July 1	July 15
Chard	Mar 15	Mar 20	Apr 1	June 15	July 15	Aug 1
Collards	Mar 1	Mar 10	Mar 15	Aug 15	Aug 20	Aug 30
Sweet Corn	Apr 10	Apr 20	May 1	June 15	July 10	July 20
Cucumbers	Apr 20	May 1	May 10	June 15	July 1	July 15
Eggplant (plants)	May 1	May 10	May 15	June 1	June 15	July 1
Garlic	-	-	-	Nov 1	Nov 7	Nov 15
Kale	Mar 10	Mar 20	Apr 1	July 15	Aug 1	Aug 15
Kohlrabi	Mar 15	Mar 20	Mar 25	July 15	Aug 1	Aug 15
Lettuce (leaf)	Mar 15	Mar 25	Apr 1	Aug 1	Aug 15	Sept 1
Lettuce (bibb plants)	Mar 15	Mar 25	Apr 1	July 15	Aug 1	Aug 15
Lettuce (head plants)	Mar 15	Mar 25	Apr 1	July 1	July 15	Aug 1
Muskmelons	Apr 20	May 10	May 15	June 15	July 1	July 15
Okra	Apr 20	May 10	May 15	July 1	July 15	Aug 1
Onions (sets)	Mar 1	Mar 10	Mar 15	(Spring only)		
Onions (plants)	Mar 15	Mar 25	Apr 1	June 15	July 1	July 15
Onions (seed)	Mar 10	Mar 20	Apr 1	June 1	June 15	July 1
Parsley	Mar 10	Mar 20	Apr 1	July 15	Aug 1	Aug 15
Parsnips	Mar 10	Mar 20	Apr 1	June 1	June 15	July 1
Peas	Feb 20	Mar 1	Mar 15	(Spring only)		
Peppers (plants)	May 1	May 10	May 20	June 15	July 1	July 15
Irish Potatoes	Mar 15	Mar 15	Mar 20	June 15	July 1	July 15
Sweet Potatoes	May 1	May 10	May 20	June 1	June 10	June 15
Pumpkins	Apr 20	May 5	May 10	June 1	June 15	July 1
Radishes	Mar 1	Mar 10	Mar 15	Sept 1	Sept 15	Oct 1
Rhubarb (crowns)	Mar 1	Mar 10	Mar 15	(Spring only)		
Rutabaga	Mar 1	Mar 10	Mar 15	July 1	July 10	July 15
Southern Peas	Apr 20	May 5	May 10	June 15	July 1	July 15
Snow Peas	Feb 20	Mar 1	Mar 15	July 20	Aug 1	Aug 8
Spinach	Feb 15	Mar 1	Mar 10	Aug 15	Sept 1	Sept 15
Summer Squash	Apr 20	May 10	May 15	July 15	Aug 1	Aug 15
Tomatoes (plants)	Apr 20	May 5	May 15	June 1	June 15	July 1
Turnips	Mar 1	Mar 10	Mar 15	Aug 1	Aug 10	Aug 20
Watermelons	Apr 20	May 5	May 15	June 15	July 1	July 15
Winter Squash	Apr 20	May 10	May 15	June 15	July 1	July 15

¹ Based on average of early maturing varieties. Mid-season and late-maturing varieties need to be planted 15 to 30 days earlier than latest date. Nearly all of the fall-planted garden crops will require irrigation during dry periods. Additional insect controls may be necessary for these tender young plants.



SNAKES:

Information for Kentucky Homeowners

Thomas G. Barnes, Extension Wildlife Specialist, FOR-46

Habitat

Snakes like to live in damp, dark, cool places where food is abundant. Likely places around homes to find snakes include:

1. Firewood stacked directly on the ground.
2. Old lumber or junk piles.
3. Gardens and flower beds with heavy mulch.
4. Untrimmed shrubs and shrubs growing next to a foundation.
5. Unmowed and unkept lawns, abandoned lots, and fields with tall vegetation.
6. Pond and stream banks where there is abundant debris or trash.
7. Cluttered basements and attics with a rodent, bird, or bat problem.
8. Feed storage areas in barn hay lofts where rodents may be abundant.

The venomous snakes in Kentucky have more specialized habitat requirements. Cottonmouths are confined to a few choice wetlands and swamps in western Kentucky (Figure 1a). Cottonmouths may be common in those swamps, such as Murphy's pond, but the number of swamps where they can be found is declining because these wetlands are being converted into agricultural fields.

Pygmy rattlesnakes are rare in Kentucky. These small snakes are sometimes encountered when they cross gravel roads in the evening. Their range is restricted almost entirely to the Land Between the Lakes region (Figure 1b).

Timber rattlesnakes prefer sparsely populated forested areas where there are numerous rock outcroppings, rocky slopes, and boulders. At one time, timber rattlesnakes were common throughout Kentucky. Because humans have disturbed much of this snake's habitat, timber rattlesnakes are becoming uncommon throughout Kentucky and do not occur in the inner Bluegrass region (Figure 1c). Killing a rattlesnake is now an unusual occurrence and is considered front-page news in local newspapers.

Copperheads are the most abundant venomous snakes found in Kentucky. They can be found throughout the commonwealth but are rare to absent in the inner Bluegrass region (Figure 1d). Copperheads prefer to live in hilly forested areas with rocky bluffs and ravines. They can also be found along wooded stream borders, old fields, and meadows where they search for rodents.

Copperheads cause the majority of venomous snake bites in Kentucky. Their bites are almost never fatal, and fewer than 10 percent of rattlesnake bites are lethal.

Identification of Venomous Snakes

Because all of Kentucky's venomous snakes are members of the pit viper family, you can easily tell the difference between venomous and harmless snakes. The three ways to distinguish venomous snakes in Kentucky:

Pupil shape. The black part in the center of the eye (pupil) of harmless snakes is round. venomous snakes have egg-shaped or cat-like (elliptical) pupils (Figure 2a). In good light, you can easily see the pupil shape from a safe distance because snakes cannot jump nor can they strike from more than one-third of their body length.

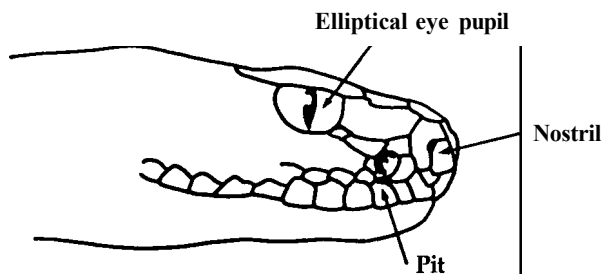
Pit. venomous snakes in Kentucky also have a very conspicuous sensory area or pit (hence the name "pit viper") on each side of the head. The pit looks somewhat like a nostril and helps the snake locate warm-bodied food. It is located about midway and slightly below the eye and nostril (Figure 2a). Harmless snakes do not have pits.



Figure 2. Identifying Venomous Snakes

Figure 2a.

VENOMOUS



NON-VENOMOUS

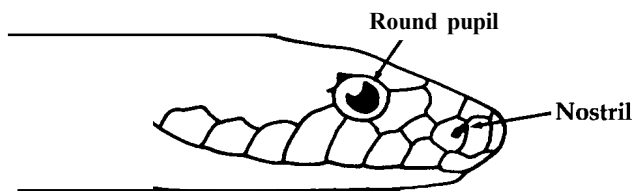
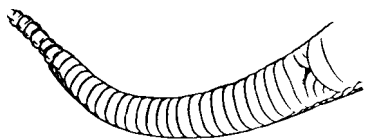
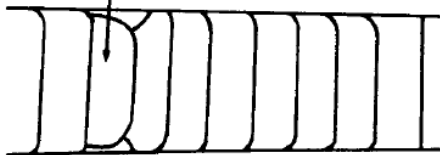


Figure 2b.

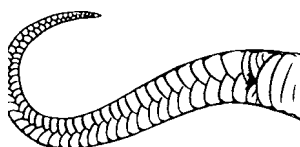
VENOMOUS



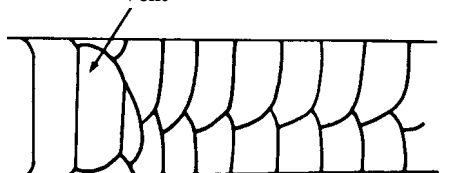
Vent



NON-VENOMOUS



Vent



Scale arrangement. The underside scales of a venomous snake’s tail go all the way across in a single row from the anal plate (Figure 2b). The very tip of the tail may have two scale rows. Nonvenomous snakes have two rows of scales from the vent to the end of the tail. This characteristic can also be observed on skins that have been shed.

Other features that may help you identify a venomous snake at a distance:

Head shape. Venomous snakes usually have a triangular (wide at the back and attached to a narrow neck) or “spade-shaped” head. Be aware that many harmless snakes flatten their heads when threatened and may appear venomous.

Distinctive sound. Rattlesnakes will usually sound a warning rattle (a buzz or a dry, whirring sound) when approached. However, many nonvenomous snakes (black racers, corn snakes, rat snakes, milk snakes, and pine snakes) and several venomous snakes (copperhead and cottonmouth) often vibrate their tails when threatened. The sound produced by this vibration often imitates a rattle or hissing sound when the snake is sitting in dry grass or leaves.

Tail. You can easily recognize young cottonmouths and copperheads by their bright yellow or greenish yellow tail.

Beneficial Aspects of Snakes

Before deciding to kill a snake in your yard or garden, consider the many benefits of snakes. Snakes are one of nature’s most efficient mousetraps, killing and eating a variety of rodent pests. Although snakes will not eliminate pests, they do help keep their numbers in check. Some harmless snakes (king snakes, milk snakes, and black racers) eat other snakes, including venomous ones.

Snake venom has been used in developing a variety of human medicines. One type of high blood pressure medicine was developed using information based on chemical secrets contained in snake venom. Researchers are conducting studies using snake poisons in developing treatments for blood and heart problems. Snake venom is also being investigated for controlling some types of harmful bacteria.

Most snakes in Kentucky are not protected by state law. You should obtain a collecting permit from the Kentucky Department of Fish and Wildlife Resources before attempting to catch and keep a snake.

Some snakes are quite rare (Kirtland's snake, copperbelly water snake, Northern pine snake, and scarlet snake) and are being reviewed for the federal government's endangered and threatened wildlife list. The state lists several other species as endangered, threatened, or rare. These include the Eastern coachwhip, green water snake, broad-banded water snake, pygmy rattlesnake, western and eastern ribbon snake, western mud snake, and scarlet king snake.

Controlling Snake Problems

No fumigants or poisons are registered for snake control. Various home remedies, including moth balls, sulfur, lime, cayenne pepper, sticky bird repellent, coal tar and creosote, gourd vines, or musk from king snakes, have not proven effective in deterring snakes. There is a snake repellent registered for rattlesnakes and checkered garter snakes. The active ingredients are naphthalene and sulfur. Three field studies have shown it has limited effectiveness for most species. The only efficient method of discouraging snakes is to modify the environment so they find it unattractive.

Managing Internal Parasites in Sheep and Goats

Purdue Extension, AS-573-W, Kate Hepworth, Mike Neary, Terry Hutchens, University of Kentucky

Developing a parasite control plan aimed at Haemonchus, will help control the majority of other dangerous parasites as well.

Lifecycle

Sheep and goats are generally affected by the same parasites, although certain parasites may affect one species more severely than the other, and treatment methods may vary between sheep and goats. In order to know how best to prevent future problems with parasites and control current infestations, it is necessary to understand the general life cycle of the parasites most common to sheep and goats.

Haemonchus has a lifecycle that takes approximately 21 days to complete (see Figure 1). The cycle begins when the larvae in the infective L3 stage of development are ingested from the grass and travel to the abomasum, or true stomach, of the host. Once in the abomasum the larvae will follow one of two paths. They may proceed with further larval stages and the eventual development into adults, or they will go into hypobiosis. This is an inhibited, or arrested development state, that occurs when conditions are not conducive for the entire life cycle to be complete. When the L3 stage larvae enter the abomasum, provided that environmental conditions are favorable, they will molt into the L4 stage of larval development and will then molt once more into adults.

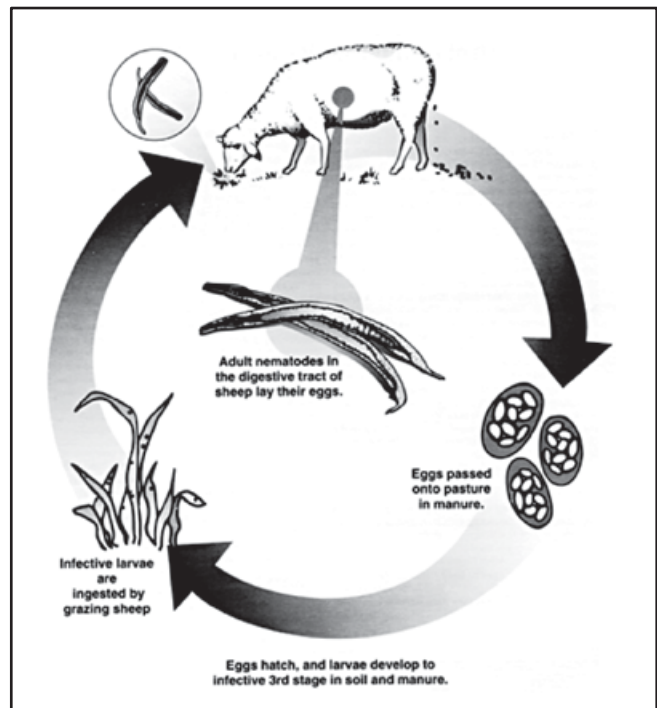


Figure 1: The lifecycle of a gastrointestinal parasite. This image is courtesy of Virginia Tech Cooperative Extension.

Factors that induce the molting of the L4 larvae into adults include: greening of grass, a rise in environmental temperature, rain following a drought period, increased estrogen levels in the host, and possible even a photoperiod stimuli. Once the molt into an adult form is complete adults then begin to lay eggs in the abomasum.

In the case of *Haemonchus* and *Ostertagia*, the L4 larvae can go into arrested development, or hypobiosis. Hypobiosis is a period of dormancy that occurs when the environment is not conducive to the lifecycle of these parasites. Larvae in different regions may go into hypobiosis in different times during the year, depending on the environment. For example, in the Midwestern states, *Haemonchus* larvae will likely become dormant during harsh winters. In southern parts of the country, hypobiosis may occur when the weather is too hot or dry for larvae to survive.

During hypobiosis the L4 larvae hibernate in glands in the abomasum without developing further or causing problems for the host. They remain metabolically inactive until they receive signals that indicate it is time for them to resume development and then begin to lay eggs. The signals that spur the L4 larvae to come out of hypobiosis are the same signals mentioned above that indicate to them to develop in the first place. Once larvae leave hypobiosis, they resume the normal lifecycle and begin to lay eggs.

Haemonchus adults require about 14 days to begin laying eggs (see Figure 2) in the stomach after reaching adulthood. The *Haemonchus* adult female can lay up to 5,000 eggs per day, yet another reason why *Haemonchus* is so difficult to control and so dangerous to sheep and goats. Females that have gone through hypobiosis over the winter generally resume development two to four weeks prior to lambing or kidding and begin to produce eggs. This phenomenon is called the “periparturient rise” in fecal egg counts (will be discussed later). The eggs laid in the abomasum are expelled from the body via the feces.

Eggs in the feces generally remain inactive for a few days in the environment, until the environment and temperature become favorable for the development of these eggs into larvae. The larvae hatch from the egg and then emerge from the pellets and move through larval stages L1, L2 and L3 of development.

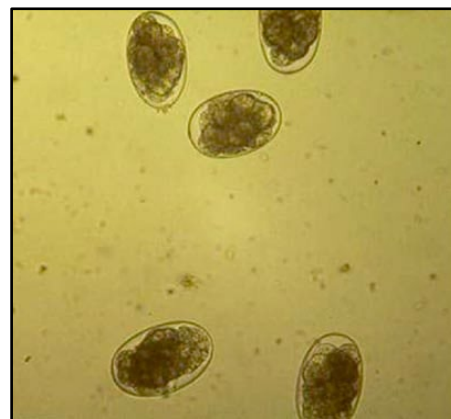


Figure 2: This image shows magnified eggs of *Haemonchus contortus*.



Figure 3: This image depicts larvae inside a droplet of water on a blade of grass.

Once the larvae reach the L3 stage, the infective stage, they emerge from the fecal pellet and climb up onto blades of grass (see Figure 3) where they wait to be ingested by a grazing animal, thus completing the lifecycle. In order for the larvae to emerge from the fecal pellet in which it was expelled from the body, the environment has to be in a condition that keeps the pellet moist and pliable. Optimal conditions for the L3 larvae to emerge from the pellet are warm, wet conditions, like those that usually occur in the early spring.

An important characteristic of these larvae that must be taken into account when designing a parasite control plan is that the L3 larvae can survive on pasture for extended periods of time, making pasture management a key component in the prevention and control of parasite infection. The L3 larvae can survive on pasture for up to 90 days in the summer, and up to 180 days in the fall or winter. The *Haemonchus* larvae thrive in temperatures ranging from 70° to 80° Fahrenheit where there is an average of approximately 2 inches of rainfall per month. Extremely hot or dry environments will cause egg laying to stop, but the larvae can survive temperatures below 32° F. *Ostertagia* larvae prefer cooler temperatures, with their optimum temperature for development being around 40° Fahrenheit. These larvae are very resistant to adverse winter conditions, and can over-winter on pasture.

Animal Susceptibility

Individual goats and sheep vary in their degree of susceptibility to *Haemonchus* and other parasites. Some animals, by means of their genetics, are much more resistant or resilient to parasitic infections, and can survive parasite levels without showing any symptoms while another animal may be killed by that level of infestation. This genetic resistance can be used when selecting breeding stock, since a herd that exhibits more innate resistance to parasites will cost less to maintain and will ultimately be more profitable to the producer.

Animal age and stage of development also have a significant impact on the susceptibility to parasites. As animals age, they are exposed to more and more parasites and develop some immunity to infection. This is more likely with sheep than with goats. Resistance describes an animal's ability to resist infection from parasites, while resilience describes the animal's ability to withstand infection from parasites once it has occurred.



Young animals that are growing and are on continuous permanent pasture are the most susceptible to parasites. These animals have very low levels of immunity, and are extremely susceptible to infection from parasites on pasture. They are also exposed to many eggs at a young age due to the periparturient egg rise of the ewe or doe. The lambs and kids will begin to develop some immunity to parasites around six to eight weeks of age, provided that they do not reach pathogenic levels of parasites in their system before this time. Lactating ewes and does on pasture follow the lambs and kids with slightly increased resistance to infection. Lactating animals are often in a negative energy balance, and therefore are weaker and less able

to resist the effects of parasites on their body. Goats at any reproductive stage are more susceptible to parasitic infection than sheep.

Ewes or does in late gestation, and for a short period after parturition lose much of their resistance to parasites due to hormonal and photoperiod effects. During this period, the ewe or doe is no longer able to resist worm development or egg production. This phenomenon is termed the “periparturient egg rise,” and is a critical time in the parasite control plan. It is particularly important because it coincides with a time when the number of susceptible animals (kids or lambs) increases significantly. Finally, mature dry ewes are the least susceptible to parasitic infections. These animals have some immunity due to their age and are under no real stress to their system that could lower their body's ability to resist parasitic infections. Goats of any age have little natural resistance or resilience to parasitic infection.

For more information visit [Purdue Extension \(AS-573-W\)](#) or contact [Suzanne Stumbo \(Pike County Extension\)](#).

Forage Tip for July



Continue grazing available summer annuals (millets, sorghum/Sudangrass, crabgrass, etc.).

Apply 40-60 lb N/A to stimulate summer annual regrowth.

Clip pastures late June/early July as needed to maintain vegetative growth and to reduce weed seeds, but don't clip lower than 4".

Identify fescue pastures for stockpiling.

Choose pastures that are well drained, have a strong sod, and have not been overgrazed.

Soil test pastures to determine fertility needs.

Using UK variety trial results, select varieties to plant in the fall and order seed.

Use a designated sacrifice lot to feed livestock hay and supplements as needed if drought sets in and no forage is available for grazing.

Master Grazer

Summer Reminders for Herds

The hot summer weather is now in full swing. Certain precautions need to be taken to avoid problems in grazing systems during these hot months. At this time, cool-season species begin to decrease in production and animals begin suffering from heat stress. Keep these key management practices in mind to reduce economic loss and other negative effects during this time.



- Do not graze forages too closely
- If grazing warm-season annuals, allow for adequate establishment before grazing.
- Clip pastures for weeds and seed-heads if needed.
- Provide animals with shade and cool, clean water to reduce heat stress and maintain animal gain
- Limit access to ponds and streams to reduce negative environmental impacts and health effects on the cattle themselves.
- Reduce risk of pinkeye by knowing and managing risk factors
- Provide animals with easy access to complete mineral feeders at all times.

For more information visit grazer.ca.uky.edu or contact Suzanne Stumbo, Pike County Agriculture Extension Agent.

Timely Tips

Dr. Les Anderson, Beef Extension Professor, University of Kentucky

Spring-Calving Cow Herd

- Consider removing bulls from the cow herd by the end of the month and keep them away from the cows. A short calving season can concentrate labor during the calving season; group calves by age so that it is easier to find a convenient time to vaccinate, castrate, dehorn, etc.; and provide a more uniform group of calves at market time.
- Mid-July is an ideal time to deworm cattle. Use a product that is effective against inhibited ostertagia. Re-implant calves which were implanted at birth if the type of implant and amount of time indicate. Calves which have not been vaccinated for blackleg should be. Spraying or using a pour-on for flies while cattle are gathered can supplement other fly control methods. Remember to work cattle early in the morning when it is cool and handle them gently to minimize stress.
- Watch for pinkeye and treat if necessary. Minimize problems by clipping pastures, controlling face flies, and providing shade. Monitor the bulls' activity and physical condition as the breeding season winds down.
- Fescue pastures tend to go dormant in July and August, so look for alternatives like warm season grasses. Try to keep the young calves gaining weight. Go to pastures which have been cut for hay to have higher quality re-growth when it is available.
- Consider cutting warm season grass pastures for hay if reserves have not been restored yet.
- Heat stress can lead to low conception rates, low libido in bulls, and embryonic loss (abortion) between days 6 and 45 of pregnancy. Keep a close eye on your herd. Plan to diagnose your herd for pregnancy early this fall to identify open cows for future planning.



Fall-Calving Herd

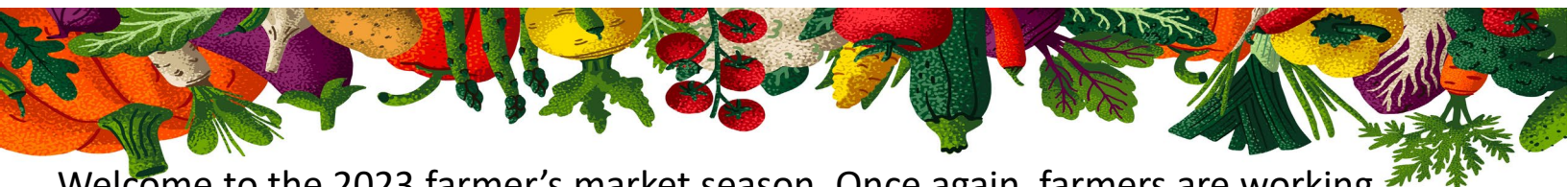
- De-worm calves in mid-July with a product that is effective against inhibited ostertagia.
- Fall-calving cows should be dry and pregnant now. Their nutrient needs are minimal, and they can be maintained on poor pasture to avoid over fattening. Keep a good free-choice mineral mix available. You can use a lower phosphorus mineral supplement now if you want to save a little money. These cows are regaining body condition after a long winter-feeding period.
- Get ready for fall calving and plan to have good pasture available at calving and through the breeding season.

Stockers

- Sell heavier grazing cattle before rate of gain decreases or they get into a heavyweight category. This will also relieve grazing pressure as pasture growth diminishes. They can be replaced with lightweight calves after pastures recover.
- Lighter cattle kept on pasture need to be rotated to grass-legume or warm-season grass pastures to maintain a desirable level of performance. Re-implant these calves and deworm with a product that is effective against inhibited ostertagia.

General

- Check pastures for downed wild cherry trees after storms (wilted wild cherry leaves are toxic to cattle).
- Be sure that clean water is always available, especially in hot weather. Make routine checks of the water supply. Cattle need 13 to 20 gallons of clean water in hot weather. Cattle should have access to shade.
- Maintain a weed control program in permanent pastures and continue to “spot-spray” thistle, honey locust, etc.
- Have forage analyses conducted on spring-cut hay and have large, round bales covered. Begin planning the winter-feeding program now. Most of the hay was cut late due to a wet spring.
- Start soil testing pastures to determine fertilization needs for this fall.
- We are finishing June in the middle of an extremely hot and dry period. Begin planning now for drought. If this weather continues, you may need to begin feeding hay/supplement August-October to allow for fall stock piling of fescue.



Welcome to the 2023 farmer's market season. Once again, farmers are working tirelessly to bring you fresh fruits and vegetables. Additionally, a handful of our farmers incorporate their crops into value added foods such as jams, jellies, salsa, pickles, cookies, candies and cakes. Crafters will be sharing their artistry, bringing jewelry, handcrafted kitchen items and sewn creations to market.

I'd like to encourage anyone that grows, crafts, cooks or bakes to join us this year and share your creativity and hard work with the people of Pike County.

Chris L. Fleniken
CajunChef Enterprises llc



2023 Kentucky Beginning Grazing School

Helping livestock producers improve profitability with classroom and hands-on learning

When: September 27-28, 2023

Where: Woodford County Extension Office
184 Beasley Drive, Versailles, KY 40383

Cost: \$60/Participant – includes all materials, grazing manual, grazing stick, fencing kit, morning refreshments, and lunch both days

Program Registration: DEADLINE is September 22, 2023

Online Registration with CREDIT CARD AT:

<https://www.eventbrite.com/e/2023-kentucky-beginning-grazing-school-fall-tickets-666511101647?aff=oddtcreator>

Registration by U.S. Mail with CHECK:

Christi Forsythe
UK Research and Education Center
348 University Drive, Princeton, KY 42445

Name: _____

Street: _____

City: _____

State: _____ Zip Code: _____

Cell Phone: _____

Email: _____

Number of participants _____ x \$60 per participant = _____ Total Amount



Please make checks payable to KFGC



2023 Kentucky Beginning Grazing School

Helping livestock producers improve profitability with classroom and hands-on learning

Emphasis on ruminants - beef, dairy, sheep, & goats

Wednesday, September 27, 2023

Thursday September 28, 2023

*****MEET AT WOODFORD COUNTY EXTENSION OFFICE EACH MORNING*****

- 7:30 Registration and refreshments
- 8:00 Introduction of staff and participants
- 8:15 Benefits of rotational grazing-Dr. Ray Smith, UK
- 8:35 Introduction to soils-Dr. John Grove, UK
- 9:05 Grazing math concepts/introduce field exercise-Dr. Katie VanValin, UK
- 9:35 Break & travel to field demonstration area
- 10:00 Hands on soil sampling-John Grove
- 10:20 Portable/seasonal water systems-Dr. Jeff Lehmkuhler, UK
- 10:40 Methods to assess pasture production and determine stocking rate-Dr. Ray Smith, UK
- 11:00 Hands-on: setting up small paddocks for grazing demonstrations-All Instructors
- 12:15 Lunch at farm (Woodford County Cattlemen)
- 1:00 Travel to local farm
- 1:30 Tour of local farm
- 3:00 Travel to teaching facility
- 3:30 Using electric fencing to control grazing-Jeremy McGill, Gallagher
- 4:00 Forage species for a comprehensive grazing system-Dr. Chris Teutsch, UK
- 4:30 Discussion and adjourn



- 7:30 Refreshments
- 8:00 Forage plant growth-Dr. Ray Smith, UK
- 8:30 Meeting the nutritional needs of grazing livestock-Dr. Jeff Lehmkuhler, UK
- 9:00 Financial assistance for improved grazing infrastructure-Adam Jones, NRCS
- 9:30 Break
- 10:00 Fencing types and costs-Dr. Morgan Hayes, UK
- 10:30 Fundamentals of laying out a grazing system-Dr. Jeff Lehmkuhler, UK
- 11:00 Small group project: grazing system design-Adam Jones, NRCS
- 12:00 Lunch (Woodford County Cattlemen)
- 1:00 How I made grazing work on the farm-Todd Clark, Clark Family Farm
- 1:30 Rejuvenating run-down pastures-Dr. Chris Teutsch, UK
- 2:00 Grazing myths that impact profitability-Greg Halich, UK
- 2:30 Complete grazing school evaluation
- 2:45 Travel to field demonstration area
- 3:00 Field exercise: observe grazed paddocks and hear reports from each group
- 3:30 Hay sampling and analysis-Jimmy Henning, UK
- 4:00 GPS and frost seeding demonstration-Brittany Hendrix
- 4:30 Final comments, diplomas, and adjourn



PIKE COUNTY MASTER GARDENERS



University of Kentucky
College of Agriculture,
Food and Environment
Cooperative Extension Service

Do you want to grow –
Better Vegetables?
Prettier flowers?
Greener Lawns?
Healthier Trees?



**Then take the Master
Gardener Class!!!**

When – Thursdays from 5:30 -7:30 pm.

Beginning August 31st, 2023 and continuing for 12 Consecutive Thursdays

Where – Pike County Extension Office

148 Trivetter Drive

Pikeville, Ky.

Main Meeting room

For more information: phone 606-616-1449 and a Master Gardener will help

Cooperative Extension Service
Agriculture and Natural Resources
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LEXINGTON, KY 40546



Disabilities
accommodated
with prior notification.

Pikeville Master Gardener Class 2023

Attend with goal to become a MASTER GARDENER!!!

Requirements:

- 1. Participate in at least 10 of the 12 classes.**
- 2. Purchase a text book. (cost \$50.00) (\$50 will be returned to participants who complete the course and they will keep the book)**
- 3. Work with the group to meet UK certification standards.**
Or
Attend with the goal of becoming a “Friend of Master Gardeners”. (Simply to gain knowledge)

All activities under the guidance of the Pike County ANR Agent, Suzanne Stumbo. For more info you may call the Pike County Cooperative Extension Office.



Pikeville Farmers Market

Saturdays 9:00 a.m.–1:00 p.m.

Tuesdays 4:30 p.m.–7:00 p.m.

Pike County Extension Service

148 Trivette Drive
Pikeville, KY 41501
(606) 432-2534
Fax: (606) 432-2536
www.uky.edu



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