

M I S S O U R I

PASTURE MANAGEMENT

GUIDE FOR HORSE OWNERS



*Helping People Help the Land
in Missouri*



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Missouri Horses and the People Who Raise Them

Missouri has about 200,000 horses, which places it third in the nation behind only Texas and California. According to the 2002 Census of Agriculture, about 142,000 horses are located on 24,000 Missouri farms. The other 58,000 horses are located at 13,000 other locations that include stables, riding clubs and residences where people keep horses on relatively small acreages. This publication is designed to present basic information about the special grazing system and forage needs of horses.

In many cases, people view their horses as pets or companion animals rather than as livestock. They

can become emotionally attached to their horses, and are interested in providing the best care for them. The majority of horse owners do not raise any other livestock.

A well-managed grazing system can offer good nutrition as well as the most economical and safest care for horses. These simple, inexpensive, low-maintenance management techniques also can protect and preserve natural resources by reducing soil erosion and preventing pollution of surface and groundwater with animal waste that washes off pastures and corrals.



Horse Facts

- Most of the time, a horse has “monocular” vision. This means a different image is seen by each eye so that a horse is seeing two different pictures at the same time. A horse can also have “binocular” vision, like humans, but only when it is looking down its nose. A horse can see completely around its entire body except for small blind spots directly in front of its face, underneath its head, and directly behind itself.
- Usually wherever a horse’s ear points is where the horse is looking. If the ears are pointing in different directions, the horse is looking at two different things at the same time.
- Horses cannot breathe through their mouths.
- Horses have a prehensile upper lip. Prehensile means “adapted for seizing, grasping, or taking hold of something.” Their upper lips are very sensitive and capable of feeling the smallest of differences in objects.
- A horse’s upper jaw is wider than its lower jaw. During normal chewing, sharp edges or points frequently form along the outside edge of the upper teeth and the inside edge of the lower teeth due to the uneven grinding surface created by the different width of the jaws.
- A horse’s age can usually be accurately determined by its teeth until the horse is about 9 years old. After that, a horse is known as “smooth mouthed” or “aged” and it becomes far more difficult or impossible to tell its age by its teeth.



Problem Grazers

It is ideal if all of the plants in a pasture are grazed evenly to the same height. But horses are uncooperative grazers. They will eat what they like best until it is no longer available, and only then will graze on other plants in the pasture. The more options horses have in the pasture, the more selective they become.

Equines have a unique digestive system which allows them to utilize large amounts of forage. Unlike ruminants, like cows, horses are basically continual grazers. They spend 13-18 hours per day grazing, while cows must spend about one-third of the day ruminating. Horses are biting top-grazers, whereas cows are tongue-lapping, tearing side-grazers. Horses eat the tops of plants until the plants in that spot are short. Then they graze new sprouts on that spot and avoid what appears to be good, taller pasture.

Consequently, when horses occupy one pasture for a long time, they graze down their favorite plants repeatedly. Grasses subjected to this repeated leaf removal are unable to photosynthesize (make their own food). They must then draw energy from their root reserves. Eventually these favorite plants are depleted to the point that they die. Bare spots and soil erosion soon follow.

The spot-grazing effect can be so intense and extensive that large spots, and finally whole pastures, are destroyed by grazing too short, too often and too much over an extended period of time.

Horses are large, heavy animals, and the negative effects of their spot grazing are compounded by trampling damage. Also, they tend to leave their manure in certain areas without distributing the nutrients and damage over the whole pasture. They will then avoid grazing these areas, wasting valuable forage.

How Forage Plants Grow


This is probably one of the most important aspects of grazing management. It is also one of the least understood.

95 percent of plant food is taken from the air. Leaves are food factories. In the presence of sunshine, they combine carbon dioxide from the air with water, nitrates and minerals from the soil to make plant food. **Short tops mean short roots.**

5 percent of plant food is taken from the soil. Roots store food. They gather and store raw materials: water, nitrates and minerals, which are converted into plant food by the leaves. This food is essential for future growth. **Short roots mean less future grass production.**

Overgrazing destroys roots and leaves. Pasture management is really leaf area management. A good rule of thumb is to **TAKE HALF, LEAVE HALF** of the plant's leaf area during any grazing rotation. This allows the plant plenty of leaf area to continue making food for regrowth.

Removing 60 percent or more of the leaf area will stop a large percentage of root growth for several days. If repeated, overgrazing occurs and plants become stressed and lose vigor. Beginning grazing heights for cool-season forages are 6-8 inches. Never graze below a 3-inch height, as to allow adequate leaf area for regrowth.



When horses are allowed to overgraze, bare spots develop and the pasture quality suffers.



E+ Fescue

Tall fescue infected with the toxic endophyte fungus (E+) has long been taboo for use as horse pasture or hay. Toxic E+ tall fescue affects all classes of horses, but the most dramatic effects are seen in pregnant mares. Pregnant mares grazing E+ tall fescue may develop thickened placentas resulting in foal death, and the mare may fail to lactate. Pregnant mares should not be allowed to graze E+ fescue or eat hay containing E+ fescue for 60-90 days prior to foaling.

While many horse owners have grazed geldings and open mares on E+ fescue safely for years, these other classes of horses exhibit an increased risk of founder when they consume E+ fescue. Other problems have been documented as well.

Varieties of tall fescue are available which do not contain the toxic endophyte. These varieties should be selected for planting. It is prudent for horse owners to eradicate the E+ fescue to the extent possible.

Pros and Cons of Grazing

Horses naturally meet their nutritional needs through grazing. It is possible to provide a balanced nutritional diet for horses that are not allowed to graze, but there are several advantages to providing good quality pastures for horses.

Good pastures provide one of the best and least-expensive means of feeding horses. The horse's digestive tract needs adequate fiber to function properly. Pasture forages provide fiber, as well as protein, minerals and vitamins.

Horses appear to be healthier when kept outside on pasture with adequate shelter because they get sunshine, fresh air and exercise. Most horses kept on pasture also have a better disposition than horses that are kept in stalls all of the time.

Grazing also may improve reproduction. Mares placed on spring pasture have been shown to ovulate up to seven days earlier than mares of similar age that are kept on dry lots and fed hay.

Without proper management, there can be drawbacks to grazing, too, both for horses and the environment.

For example, horses can be malnourished in deep, green forage. Extremely lush pastures containing more than 85 percent water can be too wet and too low in fiber for good nutrition and dry-matter intake. Horses simply need to take in too much water to get the needed nutrition. Plentiful, low-quality pasture can result in hay gut and horse digestive tract impaction (colic). Thus, supplemental feeding on pasture is sometimes needed.

If horses have not grazed pastures all winter, they should not be turned out at once on spring pasture. Immediate access to lush, spring forages can cause colic or laminitis (founder).

A crucial factor in managing horses on pasture is to avoid abrupt changes from a fed ration to pasture and from extremes of pasture quality. Changes especially are a problem when horses are moved from a lower-quality pasture, or no pasture, to a high-quality pasture.

To prevent problems when introducing horses to pastures, feed them a normal amount of hay before turning them out, and limit grazing time to one hour the first day. Then add 30 minutes to one hour of grazing time each day, or as recommended by your veterinarian.

Eating clovers, either by grazing or in hay, often causes excessive slobbering. While not particularly attractive, this poses no health concern to the horse.

In addition, there are a number of plants that are poisonous to horses that can make horses ill, or even kill them, if they are consumed.

Rotational Grazing

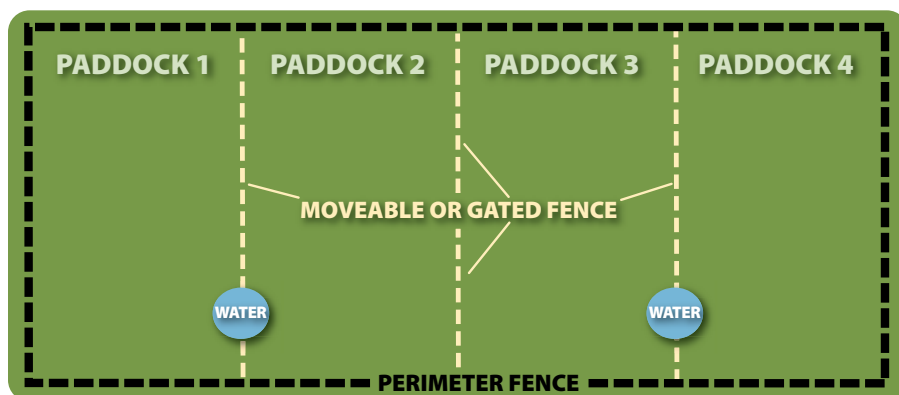
Rotational grazing involves dividing a larger pasture into several, separately fenced paddocks, and rotating horses among the smaller paddocks. The minimum number of paddocks for an effective system is four, but 12 or more paddocks are much better. Keep in mind that many of the paddock divisions can easily be done with temporary electric fencing.

Rotational grazing works because healthy forage plants are more productive if they are given an opportunity to regrow between periods of grazing. As plants grow, they become more mature and less nutritious. Young, immature plants have more leaves than stems, and leaves have two to three times more nutrition than the stems, which are more fibrous and less digestible.

Since digestibility, palatability and nutrition decrease as plants mature, the ideal pasture has young, growing plants. Rotational grazing promotes growth by forcing horses to more uniformly graze a paddock instead of selectively grazing over and over the grasses they like the most.

The rule of thumb is to start horses grazing in a paddock when the forages are 6 to 10 inches tall, then move the horses to the next paddock after they have grazed the forage to an average height of 3 to 4 inches. The paddock just grazed by horses should be mowed or grazed by other livestock to obtain a uniform, 4-inch forage height within the paddock. Allowing the ungrazed plants to remain standing without clipping could stunt regrowth of the other forages by shading them. Immediately following mowing, the paddocks should be dragged to scatter the manure.

The length of time horses graze on each paddock depends on the amount of available forage and the length of time required



Rotational-grazing paddock layout example



Don't Overstock Your Pasture

A mature horse needs about 1.5 percent of its weight each day in dry forage, though many horses don't stop eating when they've eaten all they need. If the major nutrient source is pasture, a 1,000-pound horse needs about 2,700 pounds of forage during a six-month grazing season. Most of Missouri's horse pastures are not irrigated, so with average production and management, it would take three to five acres of pasture to meet the nutrient needs of a mature horse.

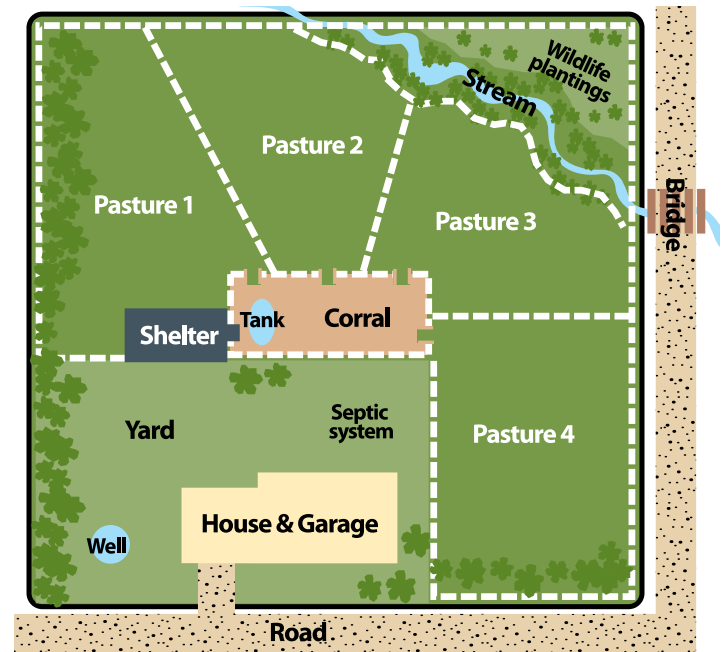
By switching to rotational grazing, the amount of pasture needed per horse can be reduced, and the grazing season can be lengthened. On moderately productive soils, as little as two acres of well-managed pasture can support one mature horse in a rotational-grazing system for seven to eight months.

for each paddock to recover from grazing. The recovery period varies seasonally with the rate of growth. The grazing manager must continually monitor the growth of the forage, and adjust grazing and recovery periods accordingly.

If animals are removed from a paddock at the proper time - when the forage is 3 to 4 inches tall - recovery will require as little as 21 days in the spring. The same paddock might require 45-60 days to recover in dry, summer months when grasses grow more slowly.

For example, if you have two horses and four acres of pasture, you could divide the pasture into eight, one-half-acre paddocks. In the spring, when the grass is growing rapidly, grazing each paddock for three days will give each paddock 21 days to recover before they are grazed again. In a dry summer month, the recovery period could be 60 days, so the grazing period on each paddock would have to be extended to eight to nine days to accommodate this.

Many horse producers don't have the proper facilities to do the best rotational grazing. If you do not have enough land to provide the forage your horses need, and you do not wish to reduce the number of your horses, you will need to keep your horses in a lot or stalls, and feed them there until your pasture or paddock has regrown to at least 6 inches.



Example of small-acreage grazing system with lot and stalls.

For example, if you only have enough land to grow forage for three horses, and you have four horses, they will have to be kept in a corral or stalls during times when the grass grows slowly to make it possible to give the forages the proper amount of rest before they are regrazed.

Horses should never be allowed to graze pastures closer than 3 to 4 inches. When your horses have grazed the pasture to this height, remove them and allow the pasture to rest until the grass regrows to a height of at least 6 inches.

Resting Guidelines

Grass and legumes need recovery time after being grazed. These are merely guidelines. Stocking rates and growing conditions greatly affect forage growth. Also, the more closely pastures are grazed, the longer the rest period needs to be for species which are sensitive to defoliation.

COOL-SEASON GRASSES

- 14-16 days during first rotation (April)
- 20-30 days during fast growth (May - mid June) and in the fall
- 30-40 days during slow growth (summer or winter)

WARM-SEASON GRASSES

- 14-21 days during early fast growth
- 21-28 days during normal growing conditions
- 35-45 days during slower growth

LEGUMES

- 24-32 days throughout growing season
- 40-45 days for seed production

General Horse Pasture Management

Key factors in management of horse pastures are proper liming and fertilizing, clipping, dragging and grazing pressure.

Test the soil

An inexpensive soil test, available from University of Missouri Extension, can help you determine the type and amount of fertilizer needed for good pasture growth. This will also help prevent nutrient runoff from over-fertilized pastures and reduce the cost of fertilizing by applying only what is needed. Test soil at least every three years to determine fertilizer and lime needs.

Manage Manure

Manure clumps are a major cause of spotty pasture growth. Horses will not graze in areas where manure is present. Manure piles can be scattered by harrowing or dragging, which helps the pasture by distributing the nutrients. It also reduces some parasite problems by exposing the parasites to sunlight. Dragging can be done with a spike-tooth harrow, flexible-chain harrow, or even just a wad of brush. For safety, only drag pastures when they are not occupied by horses. Then leave them unoccupied for at least two weeks before returning horses to the pasture or paddock.

Do not store piles of manure in places where runoff may enter streams or where floodwaters might wash the manure away. Manure piles should be at least 150 feet from streams, ponds and wells. Also establish and maintain grass buffer strips between water sources and manure piles.

Cover manure piles to keep out rainwater, or consider building a manure storage structure or composting bin. The structures protect stockpiled manure from runoff until the manure breaks down and can be used as fertilizer. There are many benefits to setting up a small composting facility. Composted manure makes an excellent,

slow-release pasture and garden fertilizer, and it is an excellent soil conditioner.

Composting produces a relatively dry product that is easily handled and reduces the volume of the manure by 40-65 percent. Composting at proper



Compost bin

Characteristics of a Good Horse Pasture

- Forage that is palatable and nutritious.
- Forage that is weed-free, leafy and which contains few seed heads.
- Surface relatively smooth and with thick forage. Horses' hooves are more damaging to sod than hooves of other animals. Do not allow horses to graze in muddy pastures because of the severe damage that will result. In addition to damaging the pasture, the uneven surfaces created can cause injury to horses.
- Easy to manage and large enough to provide quality forage and room for exercise.
- Well-drained; not in a marsh or in swampy areas. Avoid floodplains, drainage areas and tracts with long, steep slopes.
- Include an adequate supply of fresh water year-round, shade during summer, and shelter for times of adverse weather.
- Free of poisonous plants, and free of hazardous objects such as wire, stumps, junk, rocks and low-hanging limbs.
- Properly fenced.

temperatures kills fly eggs and larvae, pathogens and weed seeds.

Virtually no viral diseases are transmitted between horses and humans through fecal material, but some bacteria and protozoan, (such as *E. coli* and *Giardia*) can be transmitted in this manner. Therefore, handle manure carefully to prevent disease transmission.

Keep Horses Out of Streams

If horses must cross streams, construct a proper crossing to provide a safe, easy way. Use fencing to encourage horses to use the crossing instead of crossing the stream at will. This allows vegetation to stabilize streambanks and to reduce sediment pollution.

Establish a Sacrifice Lot

When pastures are muddy, when grass growth is very slow due to extended dry weather, or any time you don't have a paddock ready to graze, move your horses to a sacrifice lot. A sacrifice lot is an exercise paddock or riding ring on which you don't expect to keep a grass cover. The area may have grass, wood chips, stone dust or just soil. The intent is to sacrifice a small area of your property in order to give your pastures time to recover.

Locate sacrifice lots on high ground, as far away from waterways as possible. Install buffers or other erosion-control measures to filter runoff.

In areas where soils are poorly drained or deep, consider adding a packed layer of rock or limestone screenings to keep the area from becoming muddy and to help prevent injuries caused by slippery conditions. Placing a fabric under the rock layer will reduce future maintenance needs.



Perforated mats were used in a sacrifice lot to minimize damage from rain and pawing.

Commercial erosion-control pads or geo-textile fabric also can be placed in sacrifice lots and covered with soil or other materials.

Know When Not to Graze

A common mistake made by horse owners is grazing new pastures too soon. Wait until the



forage is at least 6 inches tall before placing horses on newly seeded pastures.

If the soil is wet or when rain is expected, do not turn horses into pastures, especially newly planted ones. Horses' hooves do considerable damage to forages and to the soil, even in established pastures, when the soil is wet.

Provide Fresh, Clean Water

As you divide your acreage into paddocks, establish separate water sources for each paddock, or a single water source that is accessible from all paddocks. Horses should not have to travel more than 800 feet for water. Clean, fresh water is essential for good animal health. One option is to pipe water to a trough in each pasture.

Horses can consume between 8-12 gallons of water per day when the average temperature is 50 degrees Fahrenheit. That amount increases to 20-25 gallons per day when the temperature climbs to 90 degrees Fahrenheit.

Fencing for Horses

Horse owners must have adequate fencing to safely contain and manage their horses. Fencing often is considered just a means of containing horses, which is especially important in urban areas. But fencing is much more than that. Daily labor needs and routines are influenced by the fencing plan.

The key to good horse fencing is proper construction and adequate maintenance. Safety of the handlers, visitors and the horses must receive first priority in designing horse fencing. Cost is a major consideration, but it should not dictate unsafe or inefficient fencing. While aesthetics should be considered, that also should not overrule safe, functional fencing. For example, do not place boards on the outside of posts just because it looks nicer; it's safer for horses and more functional to place the boards on the inside of the posts where leaning against the fence will not loosen boards.

Barbed wire should not be used for horses, and electric fencing alone is not recommended for perimeter fences. However, because horses are sensitive to electric shock, they can be easily trained to respect electric fences. A major concern is visibility. Electric fencing made of wide tape addresses this concern, but those tapes tend to be relatively poor conductors and do not last long. Another option is plastic-coated, 12.5-gauge, high-tensile wire developed specifically for the horse industry. It is more visible, attractive and safer than uncoated wire.

If wire is used, it should be smooth. A fence made of 12.5-gauge, high-tensile wire with a tape



for visibility works well. If electric fencing is used for perimeter fencing, four to five strands should be used. The top wire should be 40-50 inches above the ground. Two strands are usually ample for fences between paddocks, with one wire 28 inches above the ground and the other wire 44 inches above the ground.

There are a number of materials that make good horse fencing. They include: wooden posts and boards; PVC posts and boards; wooden posts and rails; woven wire; high-tensile wire; twisted barbless wire; and others. Choose fencing that safely meets your economic and aesthetic needs. To minimize damage and maintenance to your fences, consider using an electric strand on top of PVC or wooden fencing if your horse is a cribber or if it chews.



Plastic-coated horsewire, an example of permanent fencing wire, is more visible and less likely to cut a horse that may run into it.

Keep in mind a few basic fencing needs of horses when you make your choice. The general rule is that the top of the fence should be at eye level to the horse. This discourages horses from fighting over the fence.

Lightweight, temporary electric fencing consisting of polytape, polyrope or polywire strung on lightweight plastic or fiberglass posts works well for dividing a pasture into paddocks in



Examples of temporary fencing wire.

a rotational-grazing system. Use of small, uncoated, 14-gauge or 18-gauge wire commonly used with cattle is not recommended because it is not safe for horses, primarily because they cannot see it. Because of their poor eyesight, horses often make contact with the electric fence, which shocks them and makes them run. This can be disastrous if the wire gets wrapped around a horse's leg. The small wire can also cut horses when they run into it.

The Best Forages

There is no forage that is best for all situations. Several forages, singly or in combinations, make good horse pastures. But not all forages are suited for horses. Forages are classified as grasses or legumes, and further defined as cool-season grasses or warm-season grasses. Some are perennials and some are annuals.

Horse pastures should have one or two grass species that grow well on a specific soil type, plus a legume that is well adapted to the soil. Adding one or two other grass or legume species to this mixture can extend the growing season because each species has a time of the year when it produces best. By using several species, owners could provide horses with adequate pasture for most of the year.

Keep in mind that horses are picky eaters, and will over-graze the grasses they like best while ignoring the other forages. Some horses also prefer grasses over legumes. However, legume forages are more nutritious than grass forages, and they enhance the nutrition of grasses because of their nitrogen-fixing capabilities. A well-managed rotational-grazing system encourages horses to utilize all of the forage species in a paddock.

When establishing a new pasture, plant cool-season grasses in the fall and legumes in the spring. If planted together in the fall, the rapidly growing legumes crowd out the grasses. Warm-season grasses can be planted during the winter dormant period or during the spring. It is generally best to wait until the next growing season to add legumes to a warm-season-grass pasture.

Listed on the opposite page are pasture plants, including advantages and disadvantages of each, that often are used for horse pastures in Missouri.



Pasture Plants

Legumes

SPECIES	ADVANTAGES	DISADVANTAGES
Alfalfa	highly nutritious high yielding high palatability	fertility requirements management inputs short lifespan
Bird's-foot Trefoil	productive with low fertility persists well	difficult to establish low seeding vigor lower palatability
Ladino Clover and White Clover	does well with close grazing palatable winter hardy	not drought tolerant lower yielding mold may cause slobbering
Red Clover	highly nutritious adapted to wider range of soils than alfalfa	lasts only 2-3 years doesn't tolerate close grazing mold may cause slobbering
Alsike Clover	does well in wet soil	not as palatable as other clovers may cause liver damage may cause photosensitivity
Lespedeza	drought and heat tolerant does well on wide variety of soils	not as productive as red clover can get coarse stems if not kept vegetative

Cool-Season Grasses

SPECIES	ADVANTAGES	DISADVANTAGES
Tall Fescue	long lived tolerates traffic and close grazing drought tolerant good yields endophyte-friendly varieties show promise	toxicity problems in mares with endophyte infected persistence problems with endophyte free palatability problems as plants mature
Timothy	easy to establish produces well in the spring grows under wide range of soil and climate conditions	not as productive as other cool-season grasses more open sodded, increasing potential for weeds
Orchard Grass	highly palatable good summer growth	not tolerant to close grazing bunch grass offers potential for weeds
Kentucky Bluegrass	highly palatable; horses prefer it over other grasses withstands close grazing well forms dense sod widely adapted	low yields poor drought tolerance
Perennial Ryegrass	very high palatability easy to establish	less persistence poor drought tolerance requires higher fertility
Smooth Bromegrass	very high palatability good drought tolerance	requires higher fertility low fall yields doesn't persist with close grazing
Reed Canary Grass	does well in very wet areas drought tolerant excellent sod former	low palatability; utilization low



Warm-Season Grasses (Introduced)

SPECIES	ADVANTAGES (ALL SPECIES)	DISADVANTAGES (ALL SPECIES)
Bermuda Grass and Old World Bluestems	good production during summer tolerates close grazing form dense sod	difficult and expensive to establish quality and palatability drops drastically with maturity requires good fertility can be invasive

Warm-Season Grasses (Native)

SPECIES	ADVANTAGES (ALL SPECIES)	DISADVANTAGES (ALL SPECIES)
Big Bluestem Little Bluestem Indian Grass Eastern Gamagrass Switch Grass*	provide good summer production require less fertility not invasive	difficult and expensive to establish will not tolerate close grazing can become coarse, stemmy, low quality if too mature *monocultures of switch grass may cause photosensitivity and liver damage

Other Forages That Can Be Used

COOL-SEASON ANNUALS

Wheat
Oats
Rye
Triticale
Annual Ryegrass

WARM-SEASON ANNUALS

Crabgrass
Pearl Millet
Browntop Millet

Forage Species to Avoid

Alsike Clover
Arrowleaf Clover
Sweet Clover
Vetch
Endophyte-Infected Tall Fescue (for broodmares)
Sorghum
Sudan Grass
Sorghum/Sudan Hybrids
Switch Grass
Johnson Grass
Goose Grass

Poisonous Plant Considerations

Most plants that are toxic to horses are broad-leaved. Horses normally do not like broad-leaved weeds but will graze them if more desirable forage is limited. Having a few toxic plants available does not mean you have an acute problem. The list below contains some common potentially toxic plants. It is intended only to increase awareness of potential problems and stress the need for weed control.

Bitterweed	St. John's Wort
Black Locust	Wild parsley or carrot
Cocklebur	Yarrow
Horsetail	Landscaping and garden
Milkweed	plants: castor bean,
Ornamental Yew*	gladiolus, ivy, pea vines,
Pigweed	boxwood, tomato
Snakeroot	

*Very toxic to horses



For more information on fencing and watering livestock, please see "Electric Fencing for Serious Graziers" and "Watering Systems for Serious Graziers," available at your local Missouri NRCS office or online at www.mo.nrcs.usda.gov/news/mopubs.html

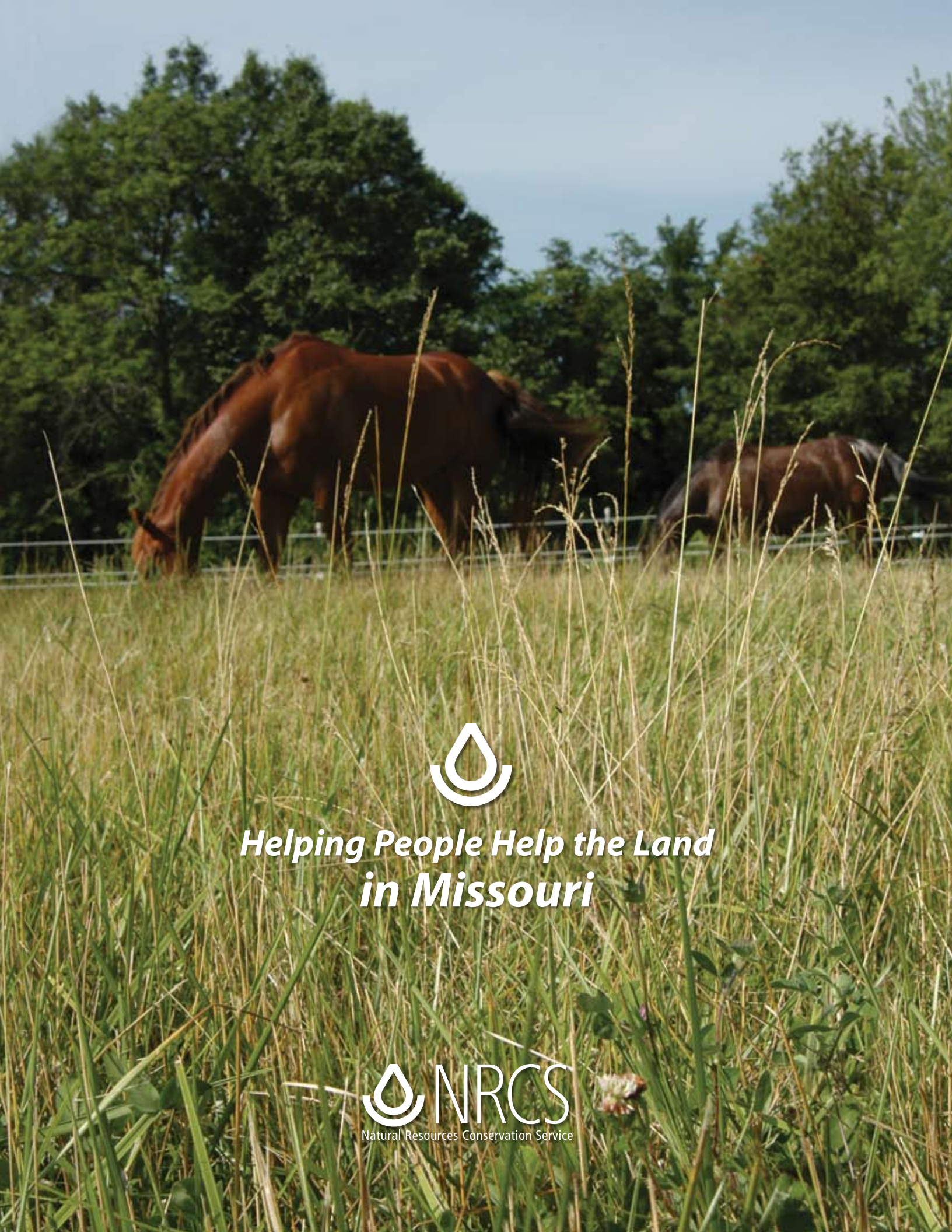


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