

# Rotational Grazing for Michigan Horses



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## Hay Is for Horses – And So Is Grazing

Horses<sup>★</sup> need forage, either as hay or pasture, because forage is one of the most important components of the equine diet. Most horses in Michigan eat a lot of their forage in the form of hay, especially during the winter months.

Even horses that eat a great deal of hay, however, need to graze on pasture. It's important for their physical and mental health.

The four most common grazing strategies for Michigan horses are:

- **Continuous or full pasture** – Giving the horses access to the same pasture all or nearly all of the time.
- **Partial season pasture** – Allowing horses to graze on the same pasture for only part of the year, typically for some part of the growing season.
- **Turnout with grazing** – Putting the horses out to graze on the same pasture for short periods every day.
- **Rotational grazing** – Rotating the horses through a series of cells or paddocks (sections of a

larger pasture that typically is divided by temporary fencing) over a few days or weeks.

Most horse owners are familiar with the first three options, but may not know as much about the fourth, rotational grazing. This bulletin describes what a rotational grazing system is and helps you decide whether such a system is right for you, your land and your horses. It is designed to provide information about many aspects of rotational grazing systems, including:

- Where and how big each paddock (section of the larger pasture) should be.
- How many horses your pasture can accommodate.
- The best grasses for your pasture.
- The equipment you'll need to set up such a system.
- How long horses should be allowed to graze in each paddock.
- How long to let each paddock “rest” between grazing periods.
- What makes a “sacrifice lot” such an important part of a rotational grazing system.

<sup>★</sup> In this bulletin, “horse” refers to all equine, including ponies, mules and donkeys.



## Why Rotational Grazing?

The main purpose of a rotational grazing system is to improve the quality and quantity of forage that is available for your horses. This reduces the amount of hay and grain you have to feed and helps you maintain a consistent ground cover on your pasture.

Left to graze on the same pasture every day, horses will repeatedly graze on their favorite plants, even if those plants are only barely tall enough to be nibbled anymore. Eventually the favored plants will die, leaving bare spots and decreasing the overall quality of the pasture. In fact, the surviving plants may be weeds the horses don't want to eat or that may actually be toxic to them.

A rotational grazing system increases forage growth by providing rest periods that give the horses' favorite plants in each paddock time to recover. It also encourages horses to graze the pasture more uniformly. This makes more efficient use of the forage growth so you may be able to manage more horses on less acreage. It takes time and effort to make a rotational grazing system work. In exchange for that time and effort, though, you can save money, decrease the environmental impact of your farm and have healthier horses.

## How Many Horses?

You'll have to identify how many usable acres you have available and are willing to use for your horse pasture. Then you'll have to decide how many horses your pasture can support.

Say, for example, you own 15 acres, and you want to know how many horses your land can support. Michigan terrain has lots of water, trees and swamps, and your land is no exception. When you measure, you discover that 7 acres are covered with buildings, lawn, woods and swamp. That leaves 8 acres you could use as horse pasture. Those 8 acres are called "usable acres." The number of horses those 8 acres can support is called the "stocking rate." In very general terms, 2 acres of pasture per horse is the recommended stocking rate for climates such as Michigan. Vegetation may survive greater stocking rates for short periods of time when growing conditions are ideal. But it's very hard or nearly impossible to maintain any sort of long-term vegetative cover if the number of horses is more than twice the number of usable acres.

## What Do I Do Now?!

Horse owners and managers who contact their local MSU Extension office often ask questions like these:

- My horse pasture is down to dirt and weeds and I'm having to feed more hay than I can afford. How can I fix the pasture so I can feed less hay?
- My horses are like grazing machines! How can I keep my horses from overgrazing my pasture?
- My horse pasture didn't make it through the winter. What can I plant to make a good pasture that will survive a Michigan winter *and* stand up to having my horses graze on it every day?

This bulletin provides some answers to those questions.



## The Components of a Rotational Grazing System

Rotational grazing systems require several key components:

- A relatively large pasture that can be divided into a sacrifice lot or area and two or more paddocks.
- Permanent and temporary fencing.
- Suitable pasture plants.
- Your willingness to manage the whole system, including moving fences and animals, seeding and reseeded plants, cleaning up manure, maintaining safe surfaces in the sacrifice lot and supplementing with hay.

### The Sacrifice Lot

No matter how big your horse farm is, creating a sacrifice lot for your horses is an essential part of making the most of your pasture resources. A sacrifice lot (see fig. 1) is an outdoor area that is big enough for the horses to move around and get a little exercise in but isn't really big enough for them to graze.

A sacrifice lot is different from pastures that horses are turned out in for a few hours a day and from unmanaged pastures on which horses graze all day, every day – sometimes to the point of overgrazing. A sacrifice lot is a place to securely confine horses when they shouldn't be on pasture, including when:

- You're carrying out routine pasture maintenance procedures such as clipping weeds, dragging the surface to even out the footing and break up clumps of manure, and fixing fences.

**Figure 1.** A relatively small sacrifice lot such as this allows horses to move and get some exercise at times when they shouldn't be on the larger pasture.

- The ground is so muddy that hoof traffic would damage the grass.
- Paddocks need a few extra days to regrow because of accidental overgrazing.
- The grass isn't growing much or at all, such as in winter or during a drought.
- You're cleaning stalls in the barn.

Consider the following points when you're planning a sacrifice lot:

- **Location** – When siting a sacrifice lot, consider its location in relationship to any buildings on your property and its accessibility to your paddocks. Keep sacrifice lots away from wetland areas, surface waters and water wells. Choose a level area to help keep sediment and nutrients from running off the lot. Put the sacrifice lot in a south- or east-facing area if you can so that it gets enough sunlight to help it dry out after rain, snow and thaws.
- **Size** – As you work out how big to make the sacrifice lot you'll have to balance the need to reserve most of your pasture space for paddocks planted to forage plants with the horses' need for exercise (see fig. 2). *The Horse Facilities Handbook* (Wheeler, Koe-

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nig, Harmon, Murphy, & Freeman, 2005) recommends providing at least 1,000 square feet per horse for an exercise area.

- **Amenities** – The site should have appropriate fencing and shelter, ample room to feed hay and a clean water supply.
- **Maintenance** – The site should allow for easy collection of manure and control of runoff. You can find information about the GAAMP (Generally Accepted Agricultural and Management Practices) for manure management and use on the “Right to Farm Act” section of the Michigan Department of Agriculture and Rural Development (2012) website.

Removing manure regularly will help control parasites and odors. How often you’ll need to remove manure will depend on how many horses you keep on the lot. Divert as much of the storm water that comes off of any buildings close to the sacrifice lot as far away from the lot as you can. Maintain a vegetated filter strip or a thick stand of

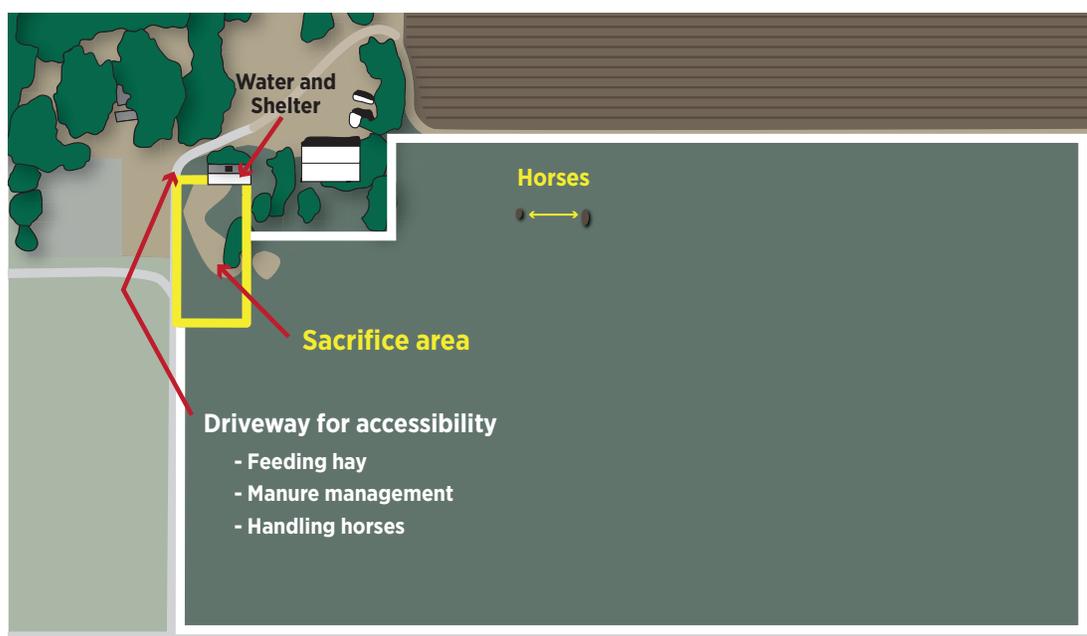
grasses or pasture around the sacrifice lot to help filter any sediments and nutrients that may wash away from it.

- **Surface** – It’s hard to maintain vegetative cover in a sacrifice lot. Providing an improved foundation such as sand, crushed rock or wood chips around high traffic areas may help you and your horses deal with mud during wet weather. You may even choose to pour a concrete pad under the water tank and any hay racks you use.

## The Paddocks

Before you decide how many paddocks you need and how to subdivide your pasture into those paddocks, you need to understand how pasture plants grow.

Every time a plant is grazed on, it needs a rest period so it can regenerate its leaves and restore energy to its roots. If it is grazed again before the roots are fully recovered, it will be weakened. If a plant is overgrazed repeatedly, it will eventually die.



**Figure 2.** A diagram of a sacrifice lot and the pasture it is designed to protect. Note the size difference between the two.



The number of rest days a plant needs depends on the season, the local climate and the plant species. Most of the pasture species that are commonly grown in Michigan prefer cool temperatures. They grow fastest during spring, a bit slower during fall, and slowest during the heat of summer. Lack of water and sunlight also reduce plant growth rates.

As a general rule, don't leave horses on one paddock for more than 7 days at a time. After any grazing period, give the paddock at least 21 days to rest. Rest periods can be shorter in spring when the grass is growing quickly. They'll probably need to be longer in the summer when the grass is dormant or nearly dormant.

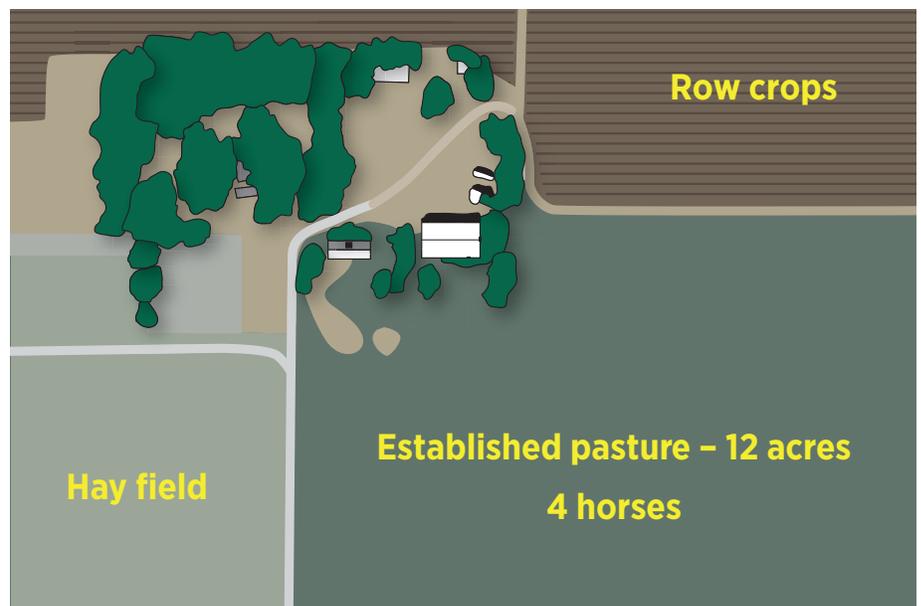
The most basic rotational grazing system has just two paddocks. It's better than no rotation at all, but it doesn't allow for the optimum schedule of 7 days of grazing followed by 21 days of rest. You'll need at least four paddocks to maintain that rotation schedule. Using more than four paddocks allows for shorter grazing periods and longer rest periods, which is even better for the plants.

Figure 3 is a diagram of a farm with 12 acres of established pasture. Figure 4 shows one of many ways the same pasture could be divided into paddocks in a rotational grazing system. If you're using a rotational grazing system for the first time, you'll need to experiment with the size and number of paddocks to find the combination that will work best for your farm.

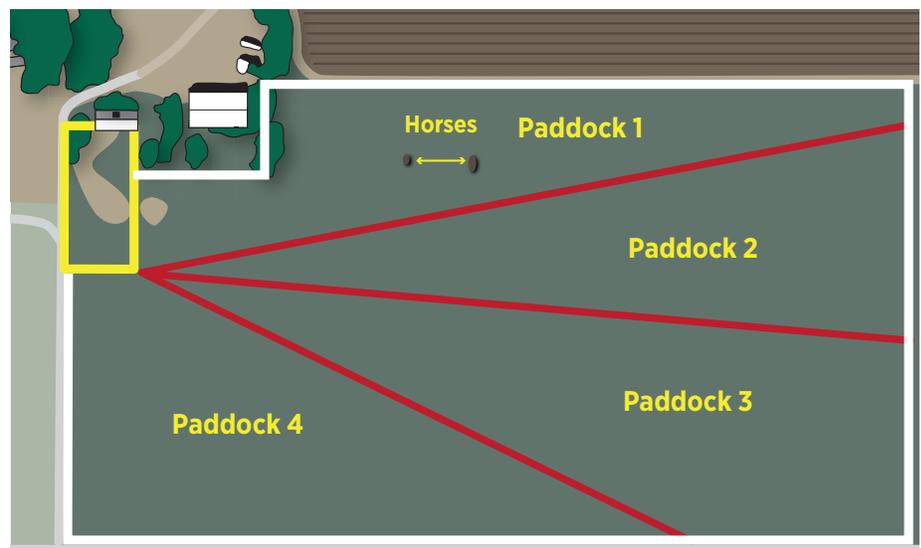
The location of water sources is critical in laying out the paddocks because water must be available in every one.

The pie-shaped layout shown in Figure 4 is popular because of the convenience of placing a single water tank at the spot where all of the slices come together.

It takes more fence to enclose the long, narrow paddocks in a pie-shaped layout than it does to enclose an equal area in a square, though, so the pie-shaped layout is more expensive. Animals also tend to graze long,



**Figure 3.** A diagram of a farm with 12 acres of pasture used by four horses.



**Figure 4.** An enlarged view of the 12-acre pasture from figure 3 that shows the pasture divided into four pie-shaped paddocks.



narrow paddocks unevenly because they usually prefer to stay in one end or the other.

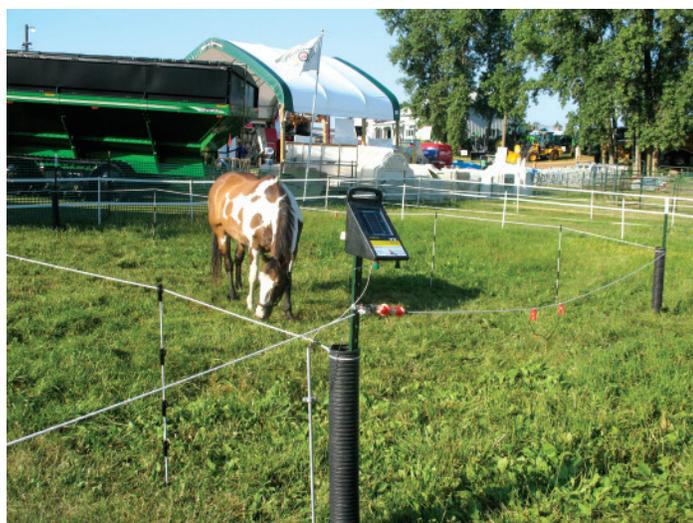
## The Fencing

Fencing is a major consideration for any horse farm. The safety of the horses, handlers and any visitors to the farm is the first priority in designing a fencing system. Cost is also a major factor, but it shouldn't keep horse owners from choosing safe, functional fencing. Perimeter fencing is usually built to be permanent, while interior fencing (see fig. 5) may be temporary and portable. Figure 6 shows portable paddock fencing built with plastic step-in posts or steel T-posts and electrified rope or tape.

No matter what type of temporary fencing you use, you'll have to give horses time to adjust to the concept of a rotational grazing system.

## Managing Pasture Plants

Even with appropriately sized and fenced paddocks, if the plants in your paddocks aren't growing well, your rotational grazing system could fail. Four elements come into play when considering pasture plant productivity:



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Figure 5. Interior fencing.

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Figure 6. Interior fencing.

- Soil fertility
- Plant species
- General plant resting guidelines
- Forage availability

This section addresses each of these four factors.

## Soil Fertility

Have you had your soil analyzed lately? Plants can't grow properly without the right nutrients, and conducting a soil test will identify which nutrients your soil needs.

Michigan State University Extension recommends that you have your soil analyzed at least every 3 years. The soil test results will indicate what amendments your soil needs. Making these changes can yield benefits such as:

- Saving money and protecting the environment by managing soil pH and fertilizer applications.
- Improving plant growth.

Your soil test report will include fertilizer and lime recommendations. If the report suggests applying lime to adjust the soil pH, do so before applying fertilizer,



## Collecting & Submitting Soil Samples

You'll need these tools to collect soil samples:

- Soil probe or shovel
- Clean, plastic bucket

Working in a zigzag pattern (see fig. 7), take 15 to 20 random samples per field. Each sample should be 8 inches to 12 inches deep – don't just skim the surface. Mix the samples together in the bucket, then pull out about a pint (2 cups) of dry soil to submit to the soil testing laboratory. (**Note:** Don't dry the sample in an oven or with a hair dryer or other device before you send it off for testing. Doing so can change the nutrient levels in the sample and skew the results.)

For more information about how to collect and submit soil from your pasture for a soil test, visit MSU's Soil and Plant Nutrient Laboratory at [www.psm.msu.edu/SPNL/](http://www.psm.msu.edu/SPNL/).

because soil absorbs the nutrients in fertilizer more fully if the soil pH is at or close to the proper level. Depending on the current and target soil pH and the amount and type of lime you apply, it can take from six months to a year for broadcast lime to fully adjust the pH of acid soils.

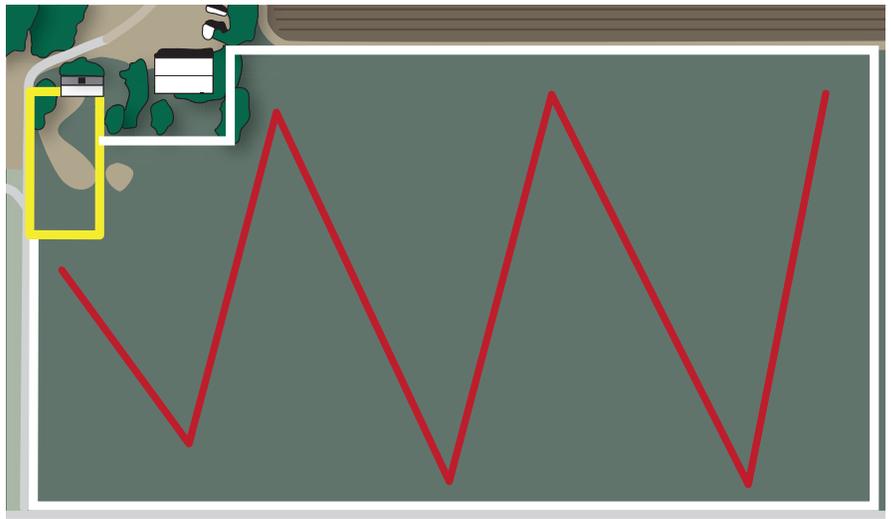
### Plant Species

No single forage species is best for all pastures, but many forage species, planted alone or in combination with others, can make good horse pastures.

Forages are divided into legumes and grasses. Grasses are further divided into cool-season and warm-season species.

Warm-season grasses are plants that grow most vigorously from June through early September. They are well-adapted to hot, dry weather, and will stay green in July and August.

Cool-season grasses grow best in the spring and fall when soil and air temperatures are cooler.



**Figure 7.** The recommended zigzag pattern to follow when collecting soil samples for a soil test.

Legume plants are notable for their ability to fix atmospheric nitrogen. This is due to their symbiotic (mutually beneficial) relationship with a kind of bacteria called rhizobia, which is found in the root nodules of these plants. This mutualism reduces the plants' need for nitrogen fertilizer. When legumes are used in pasture mixtures, they provide nitrogen to the companion grasses.



## General Plant Resting Guidelines

Resting guidelines for cool-season grasses and legumes follow:

- Cool-season grasses such as timothy, orchardgrass, Kentucky bluegrass, perennial ryegrass, smooth brome grass and (low-alkaloid) reed canarygrass will do best with the following resting schedule:
  - 14 to 16 days during early spring
  - 20 to 30 days during typical fast growth (late spring to midsummer, and in the fall)
  - 30 to 40 days during typical slow growth (summer or winter)
- Legumes such as alfalfa, birdsfoot trefoil and ladino white clover benefit from 24- to 32-day rest periods throughout the growing season.

During the winter months, it is advisable to keep horses in a sacrifice lot to reduce damage to pastures.

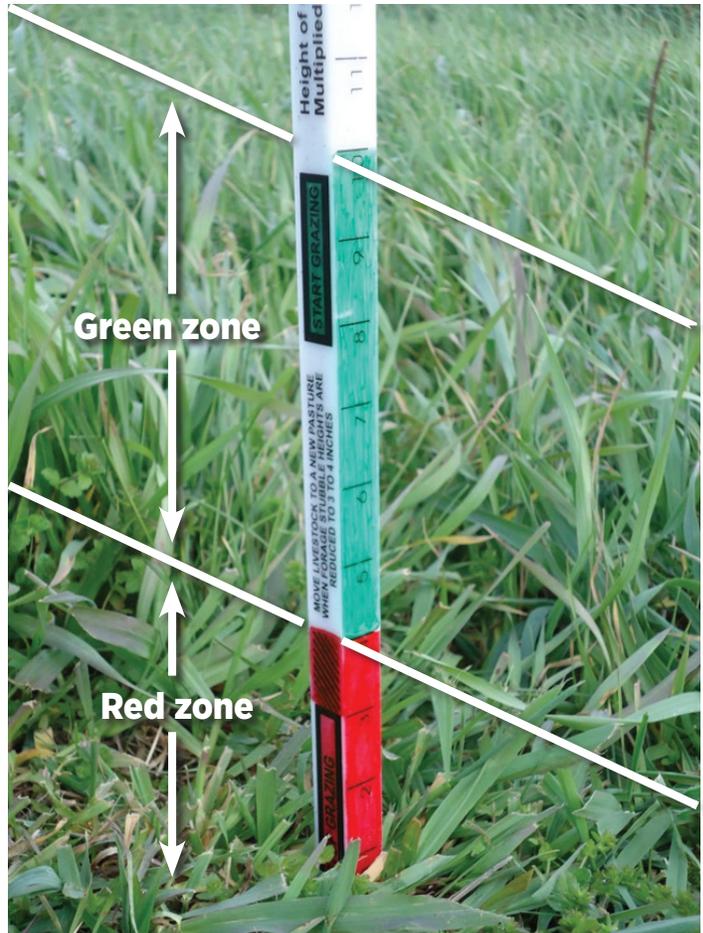
## Forage Availability

The amount of forage available for grazing is easily measured using a grazing stick or a yard stick because the amount of forage present is closely related to its height. Figure 8 shows a color-coded grazing stick that is marked for stop-and-go grazing in Michigan. As a general rule, you put horses on a paddock when the forage in it is about 6 to 10 inches tall (in the green zone), and remove them when they've grazed the forage down to 3 to 4 inches tall (in the red zone).

The only common Michigan pasture grass that can be productive when it is grazed closer than 3 inches is Kentucky bluegrass. This is largely because Kentucky bluegrass is a shorter grass overall. Table 1 compares grazing heights for the shorter Kentucky bluegrass and the taller smooth brome grass.

## Managing the Paddocks

The paddocks used in a rotational grazing system will need regular maintenance, such as:



**Figure 8.** A color-coded grazing stick.

- Clipping and dragging
- Reseeding
- Collecting and removing manure

A paddock that has just been grazed will need to be clipped to encourage the grasses to regrow uniformly. Horses will typically graze in areas referred to as “lawns” and defecate in areas referred to as “roughs.” Clipping – or in some cases, dragging – a paddock will break up the manure, which spreads and recycles nutrients throughout the pasture.

You **must** keep horses off of paddocks during wet weather to reduce the damage from their hooves.

**Table 1: Comparison in Grazing Heights of Two Cool-Season Grasses**

	Grass Height (In Inches) to START Grazing	Grass Height (In Inches) to STOP Grazing
<b>Kentucky Bluegrass</b>	4–6	1–2
<b>Smooth Bromegrass</b>	8–10	3–4

Reseed overgrazed or bare areas in late summer or early fall, or try frost seeding. In frost seeding, the forage seed is broadcast onto the frozen ground before it thaws in the spring. The idea is that the repeated freezing and thawing of the soil surface will cause surface

cracks to develop that the seed will fall into, essentially “planting” it.

Frost seeding is a suitable planting method for small, slick seeds such as white clover, birdsfoot trefoil, bluegrass, orchardgrass and perennial ryegrass.

## Summary

Paying careful attention to the key components (paddocks and sacrifice lots, fencing, pasture plants, your commitment to managing the system) of a rotational grazing system will help increase your chances of success with it. (Table 2 lists some of the main advantages and disadvantages of rotational grazing for horses.)

**Table 2: Advantages and Disadvantages of Rotational Grazing**

Advantages	Disadvantages
Increased forage availability	Cost of portable interior fencing
Improved forage quality	Increased labor requirements
Better nutrient management	
Improved aesthetics	

You must be willing to use a sacrifice lot and be prepared to feed hay when needed, which will depend on weather conditions and forage growth.

You’ll need to be flexible in deciding when to rotate your horses to a new paddock. Monitoring their grazing progress may be much more productive than following a strict calendar guideline about when to do so.

While they require time, effort and commitment to set up and maintain, rotational grazing systems have the potential to help you:

- Improve the quality and quantity of forage that’s available for your horses.
- Improve the mental and physical health of your horses.
- Save money by reducing the amount of hay you must feed your horses.
- Decrease the environmental footprint of your farm.



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