Forage Management Considerations for Horses in Mississippi

Figure 1. Horses are highly selective when grazing and are destructive to pastures.

The horse population in Mississippi has been estimated at 125,891 (Myles, 2008). An understanding of various aspects of horse care and management is necessary to achieve proper animal welfare while also being cost-efficient. Pasture management considerations should include grazing effects on pasture, potentially toxic plants, pasture rotation schemes, and stocking rates. This publication outlines various management considerations to maximize forage quantity and nutritive value for equine grazing.

Overgrazing

Horses have unique digestive systems. In a natural environment, horses are constant feeders throughout the day and will often take a bite of grass, move forward a few steps, and take another bite of grass (Feist and McCullough, 1976). Unlike cattle, which use their tongues to select grasses, horses use their strong, prehensile lips to take grass into their mouths and then bite it short with their incisors (Evans, 2001). Horses can be highly selective when they graze and will often put considerable pressure on more palatable pasture grass species (Goold, 1991). This often leaves short, heavily grazed and long, ungrazed areas of pasture (**Figure 1**). Managers often mistakenly think this means there is plenty of pasture available to horses; however, the long, ungrazed portion is often where horses defecate, so they avoid grazing in these areas (Ödberg and Francis-Smith, 1977). In general, horses' selective grazing habits and trampling tend to be destructive on pastures.

Taste Aversion

Luckily for producers, horses find a wide range of grasses and legumes palatable. Unfortunately, specific research on comparative palatability has yielded inconsistent results, which may be due to differences in plant maturity between studies. Despite the difficulties in isolating a sole preferred palatable forage for horses, it has generally been found that grasses are preferred over

legumes, and herbs and pastures with mixed species are preferred over a monoculture (Archer, 1973). A horse grazing pasture typically consumes 90 percent forages, 4 percent weeds, and 6 percent browse. Forage crops grown in Mississippi that are palatable to horses include Italian ryegrass (*Lolium multiflorum*), tall fescue (*Schedonorus arundinaceus*), barley (*Hordeum vulgare*), oat (*Avena sativa*), white clover (*Trifolium repens*) and numerous annual clover species (ball, crimson, etc.), alfalfa (*Medicago sativa*), bermudagrass (*Cynadon dactylon*), crabgrass (*Digitaria* spp.), and bahiagrass (*Paspalum notatum*; NRC, 2007). For more information on species selection, planting dates, and seeding rates for horse pastures, see MSU Extension Publication 3396 *Forage Establishment in Mississippi: Recommended Seeding Rates, Planting Depths, and Planting Dates for Common Forage Species* (*http://extension.msstate.edu/publications/forage-establishment-mississippi-recommended-seeding-rates-planting-depths-and-planting*).

Forage Availability

Horses tend to select forages based on stage of growth rather than species (Fleurance et al., 2001). As a plant matures, its palatability and nutritive value declines. Consequently, differing maturation rates between species can affect selection, with horses favoring forages that mature more slowly (McMeniman, 2003). Pastures should be managed to ensure that slow-maturing forages are rested to prevent the disappearance of the preferred species from the pasture. Rest periods, rotational grazing, and mowing to maintain optimum target plant heights helps optimize the abundance of desired forages.

Understanding the growth curves of cool- and warm-season grasses can offer year-round grazing when coupled with pasture management strategies (**Figure 2**). Overseeding is the practice of establishing forage crops into an existing field without destroying the existing sod (Ball et al., 2015). In Mississippi and other states of the lower South, cool-season annual grasses and/or legumes are planted into dormant perennial warm-season pastures. This enhances the pasture's nutrition and provides a longer growing season. One benefit of overseeding legumes is nitrogen fixation, as this can lower fertilization costs while enhancing surrounding grass growth and nutritive value. Overseeding common bermudagrass with berseem clover (*Trifolium alexandrinum*) improves plot nitrogen uptake, while overseeding annual ryegrass increases dry matter yield (Mclaughlin et al., 2004).

Different pasture management systems can be implemented to ensure forage availability, preserve pasture, and save money and manpower. These may include rotational grazing, strip grazing, or having a "sacrifice" pasture or dry lot where animals are hayed while alternate pastures rest. Regardless of the grazing management system used, it is important to understand

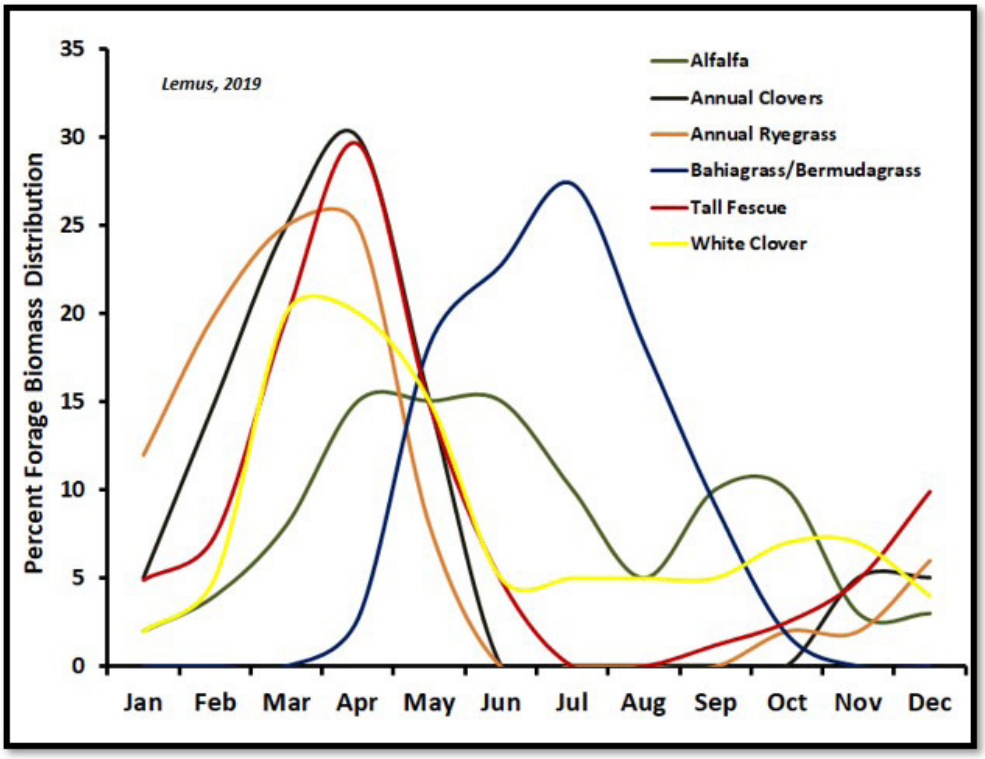

Figure 2. Seasonal biomass distribution for different forage crops grown in Mississippi.

the target heights to graze and rest pastures depending on forage type. For example, horses grazing bermudagrass should be put on pasture at 8 to 10 inches and removed when the grass is at 1 to 2 inches. On the other hand, horses grazing alfalfa should be put on pasture at 10 to 12 inches and removed at 2 to 3 inches (Ball et al., 2015). Some owners may be hesitant to allow horses to graze alfalfa, but horses do not bloat like cattle, so alfalfa is a highly palatable and nutrient-dense forage option for horses (Catalano et al., 2019; Haenlein et al., 1966). Limit the amount of time horses are allowed on lush pastures to prevent colic or laminitis.

Continuous grazing is when animals are maintained on a single pasture unit during the time grazing is permitted (Ball et al., 2015). This method allows animals to selectively graze but may result in some plants being under- or overgrazed. Allowing horses to selectively graze over an extended period can result in the encroachment of less desirable forages on the stand. Martinson et al. (2016) found that, over time, the least grazed forage, orchardgrass, became the most dominant species in pastures that were continuously grazed, regardless of initial percentage in the stand mixture. One benefit of continuous grazing is reduced labor and cost in terms of additional fencing to separate pastures. However, keeping horses continuously on one pasture can result in losses from trampling (Ball et al., 2015).

Rotational grazing is when a pasture is subdivided into several paddocks and only certain portions are grazed while others are rested and allowed to regrow before being grazed again. Rotational grazing increases labor (moving horses from pasture to pasture) and cost (additional fencing to maintain separate pastures). You may use permanent or temporary fencing, such as electric fencing, which should always be visible and introduced to horses (**Figure 3**). A major advantage of rotational grazing is increased carrying capacity, which may be 20 to 30 percent higher than in continuous grazing (Ball et al., 2015). This is due to increased forage availability and yields, along with more uniform grazing. A 2012 study by Rigueiro-Rodríguez found that pastures rotationally grazed by horses had greater plant species biodiversity than continuously grazed pastures. Additionally, University of Maryland Extension has developed an equine rotational grazing demonstration site to serve as an educational tool to show horse owners the results of properly managed pastures and grazing horses (Burk et al., 2014).

Figure 3. Restricting access to a pasture or portion of pasture allows plants time to regrow.

Limited Turnout

Often, horses are stalled at night and turned out during the day, or vice versa, depending on the climate or turnout availability. Not only is turnout important for exercise, but horses turned out for greater periods of time spend less time trampling the pasture. Even limited turnout can provide significant feed savings to a producer. Warren (2006) reported that, during the spring, 1 hour of grazing can replace 2.75 pounds of grass hay or 2.25 pounds of alfalfa hay. Careful pasture management can ensure forage availability during turnout even in a limited turnout scenario.

Forage Loss

If you feed forage in the form of hay, do so in a way that minimizes losses from defecation, urination, and trampling. However, provide enough hay so that all horses can access the hay regardless of herd dynamics (Houpt et al., 1978). Commercial round bale feeders may limit hay loss (**Table 1**). Hay feeders can reduce hay losses by up to 50 percent. One of the most recognizable feeders, the tombstone or cattle ring, can reduce hay waste by 19 percent.

Dangerous Plants

Some forages that are suitable for some species of livestock can be detrimental to horses. Sorghum (*Sorghum bicolor*), sudangrass (*Sorghum bicolor*), johnsongrass (*Sorghum halepense*), and particularly sorghum-sudangrass hybrids (*Sorghum bicolor*) are of interest, as they are safe to feed as hay to horses, but not as pasture. These summer annual grasses can accumulate nitrates during stress periods (such as drought) or prussic acid (hydrocyanic acid) after a frost (pearl millet, *Pennisetum glaucum*, does not accumulate prussic acid). Horses grazing these young, immature forages can develop cystitis and ataxia (incoordination) from prussic acid. Wait 7 to 10 days after a frost to graze pastures containing these summer annual grasses. Urinary incontinence, bladder lesions, and degeneration of the spinal cord have been observed in horses grazing sorghum (Adams et al., 1969). However, during the hay-drying process, the prussic acid content decreases to non-threatening levels.

Foxtail (*Setaria* spp.) has fine awns that can imbed in the mouth, leading to ulceration of the lips, gums, and tongue, and irritation to the gastrointestinal tract and skin around the muzzle (**Figure 4**). Horses that suffer from hay blisters often present with lethargy, excess salivation, dysphagia, red and bleeding gums, and facial swelling (Johnson et al., 2012). Fortunately, mouth ulcers can improve when horses are removed from feed sources containing foxtail. Additional problems can arise with riding horses because embedded awns can be painful and cause secondary infection. There is no target-specific herbicide for controlling foxtail without impacting other desirable forage species. To control it, mow or hay before seed heads appear and check hay for foxtail.

Figure 4. Foxtail is prevalent in Mississippi pastures.

Table 1. Impact of feeder type on hay waste and intake, weight change, and return on investment (Martinson et al., 2012).

Feeder Type	Hay Waste (%)	Hay Intake (% body weight)	Herd Weight Change (lb)	Payback in Months ($100/ton)
Waste Less	5a	2.3a	70a	8e
Cinch Net	6ab	2.4a	183a	0.8a
Hayhut	9bc	2.3a	-7ab	4c
Covered Cradle	11c	2.4a	55a	20f
Tombstone Saver	13cd	2.2a	-35ab	4cd
Cone	19d	2.1a	57a	9e
Tombstone	19d	2.2a	174a	2b
Ring	19d	2.1a	0ab	2b
Hay Sleigh	33e	2.0a	37a	5d
No Feeder	57f	1.3b	-225b	–

Means within a column with the same letter are not significantly different at $P < 0.05$.
Adapted from Martinson et al., 2012.

Horses display a strong preference for red and white clover species (Catalano et al., 2019), but one potential downside of horses grazing clover pasture, specifically red clover, is the development of excessive salivation, or "slobbers," caused by the fungus *Rhizoctonia leguminicola* (Hagler and Behlow, 1981). Although this may be worrisome to owners, it usually is not harmful and will resolve when horses are removed from the pasture. Prevent slobbers by overseeding the pasture with grasses to reduce the overall concentration of clover.

Alsike clover (*Trifolium hybridum;* **Figure 5**) is dangerous to horses as both pasture and hay because it can damage the liver. Alsike clover may look like red and white clovers, but alsike has finely serrated, hairless, sharp-toothed leaves with no white "v" on the leaves. When horses ingest these plants, chlorophyll is converted to phylloerythrin in the digestive tract. Phylloerythrin is usually removed from the blood stream by the liver. When liver cirrhosis is present, excess phylloerythrin accumulates in skin cells and reacts to certain wavelengths of light. This causes skin to blister and slough, which is most prevalent in areas with little hair or no pigmentation (Nation, 1989). Liver failure is the most common cause of death in these cases, but horses afflicted with alsike poisoning at the beginning stages of ingestion can recover when removed from the pasture.

Figure 5. Alsike clover does not have a white "v" as seen on the leaves of red and white clovers.

Producers know there are risks to feeding tall fescue (*Schedonorus arundinaceus*) to horses, but many do not realize how tall fescue affects horses and what types of tall fescue are safe. The seed heads of tall fescue can contain an endophyte fungus called *Neotyphodium coenophialum* that produces ergot alkaloids that are highly toxic to livestock. In mares, tall fescue toxicity can cause abortions, prolonged gestation, dystocia, thickened or retained placenta, agalactia (no milk produced), and an increase in newborn mortality. Reduce the effects of fescue toxicosis with careful management, such as removing mares at least 90 days before parturition and overseeding with another forage (usually an adapted legume such as white clover) to dilute the effects of the alkaloid (AAEP, 2016). Additionally, alternate strains of tall fescue are commercially available and safe to feed to horses. Novel (non-toxic) endophyte-infected tall fescue and endophyte-free tall fescue are good alternatives. However, these are not as vigorous as toxic endophyte-infected strains, so they must be managed carefully to maintain stand longevity and prevent encroachment from toxic endophyte-infected tall fescue (Ball et al., 2015). The novel and endophyte-free tall fescue varieties require a well-planned rotational grazing schedule to avoid overgrazing and increase stand persistence.

Summary

Mississippi horse owners can save time and money with proper forage management. Various grazing systems can preserve desirable forage species while avoiding losses from overgrazing or trampling. It is also essential to make sure that pastures and hay fields receive proper fertilization to maintain nutritive value and biomass production. Being aware of forages that can be toxic or harmful to horses ensures a productive operation with limited expenditure on veterinary bills. Understanding what forages are prevalent in a pasture and how to sustain them can be useful when managing horses. For more information or assistance on understanding what forages are in your pasture, contact your local county MSU Extension agent by visiting *http://extension.msstate.edu/county-offices*.

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By **Clay Cavinder**, PhD, Professor, Animal and Dairy Sciences; **Courtney Heaton**, PhD, Intermittent Worker, Animal and Dairy Sciences; and **Rocky Lemus**, PhD, Extension/Research Professor, Plant and Soil Sciences.

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