



Southern Equine Consortium

Providing research-based information for horse owners and equine operations in the Southeast region.

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Forage Considerations for Horses in the Southeast: Part 1

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Producers should consider forage management to minimize the financial cost of horse care. An understanding of how horses graze and affect pasture, pasture management, and plants to avoid can be beneficial to both small and large-scale equine operations. This two-part series will discuss various management considerations to maximize forage and forage quality when fed to horses.

1. Overgrazing of pastures: Horses are herbivores and have a unique digestive system which allows them to digest forage. 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. Unlike cattle who utilize their tongue to select grasses, horses use their strong, prehensile lips to take grass into their mouth where they then bite it short with their incisors. Because of this unique grazing method, horses can be highly selective when they graze and will often put considerable pressure on more palatable species in the pasture. This often leaves short, heavily grazed areas and long, ungrazed portions of pasture. Managers often mistake this for having plenty of pasture available to horses; however, the long, ungrazed portion of pasture is often where horses defecate, so they avoid grazing in these areas. Horses tend to be more destructive on pastures due to their selective grazing habits.
2. Forages to which horses may have a taste aversion: Luckily for producers, a wide range of grasses and legumes are found palatable to horses. Unfortunately, specific research on comparing horse preferences 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 that pastures with mixed species are preferred. Some palatable forages for horses that are grown in the Southeast are Italian ryegrass, tall fescue, barley, oats, white clover, alfalfa, dandelion, bermudagrass, crabgrass, bahiagrass, and reed canarygrass.
3. Forage availability: Horses tend to select forages based on stage of growth rather than species because as a plant matures, its palatability declines. Differing maturation rates between species can affect selection, with horses favoring forages that are slower growing. Pasture management must be taken into consideration to ensure that slow maturing forages are rested to prevent the disappearance of the preferred species from the pasture. Pasture resting, rotational grazing, and mowing pastures to maintain optimum target plant heights helps in optimizing desired forages.



Horses are highly selective when grazing and are destructive to pastures. Photo Credit: Creative Commons

Forage Considerations for Horses in the Southeast, continued.

Understanding the growth curves of cool and warm season grasses can offer a producer year-round grazing when coupled with pasture management strategies. The process of overseeding is the practice of establishing forage crops into an existing field without destroying the existing sod. In states of the lower South, cool season annual grasses and/or legumes are planted into dormant perennial warm season pastures. This serves to improve pastures by enhancing nutrition of the pasture and offering a producer a longer growing season. This can lead to benefits such as increasing average daily gains. One benefit of overseeding legumes is nitrogen fixation, as this can lower fertilization costs while enhancing surrounding grass growth. This can lead to greater nitrogen uptake by surrounding plants, as well as greater dry matter yields.

Different pasture management systems can be implemented to ensure forage availability, pasture preservation, and save money and manpower. Regardless of the grazing management system used, it is important to be knowledgeable on the target heights to graze and rest pastures depending on forage type. For example, horses grazing alfalfa should be put on pasture at 10-12 inches and removed at 2-3 inches. Bermudagrass, on the other hand, should begin being grazed at 4-8 inches and horses should be removed when the grass is at 1-2 inches.



Restricting access to a portion of pastures allows the plants to regrow. Photo Credit: Dr. Paul Siciliano.

Continuous grazing is when animals are maintained on a single pasture unit during the time grazing is permitted. 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. Over time, the least grazed forage will become 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, it is important to keep in mind potential losses such as trampling due to horses continuously maintained on one pasture.

Horse owners need to consider rotational grazing to allow ungrazed pasture to rest and regrow before being grazed again. Rotational grazing increases labor due to moving horses and cost due to additional fencing requirements to maintain separate pastures. However, a major advantage of rotational grazing is often increased carrying capacity which may be 20 to 30% higher than in continuous grazing. This is due to increased forage availability and yields after rest. Walton et al. (1981) found that when comparing cattle grazing in a continuous or rotational system, productivity was increased in rotationally grazed over continually grazed pasture. Cattle weight gains were nearly doubled when rotationally grazed and the forage produced in the rotationally grazed system was more digestible and had higher crude protein levels than continuously grazed pasture.

4. Limited turnout: Often, horses are stalled at night and turned out during the day, or vice versa depending on the climate or turnout availability. Chaya and colleagues (2006) found that horses turned out for 12 hours per day spent more time grazing than running or bucking when compared to horses turned out for 2 hours per day. Not only is turnout important for exercise, but horses turned out for greater periods of time spend less time running on the pasture which can increase trampling losses. Even limited turnout can provide significant feed savings to a producer. Warren (2006) reported that during the spring one 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.
5. Forage loss: If you feed forage in the form of hay, it should be fed in a way to minimize losses due to defecation, urination, and trampling. Additionally, enough hay should be made available that all horses can access the hay regardless of herd dynamics. A 2012 study by the University of Minnesota looked at the economic impact of 9 different commercial round bale feeders versus a no feeder control in a dry lot scenario (Table 1; derived from Martinson et al., 2012). They found that all 9 commercial feeders reduced wastage (5-33% wastage) when compared to the no feeder control (57% wastage). Greater wastage resulted in a reduction in herd weight due to a decrease in hay intake as a percentage of body weight. One of the most recognizable feeders, the tombstone or cattle ring, resulted in a hay wastage of 19%. Payback in months was also calculated, with the cinch net paying for itself in 0.8 months with hay factored in at \$100/ton.

Table 1. Hay waste, hay intake, weight change, and payback of nine round-bale feeders and a control (Martinson et al., 2012)

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

In summary, forage management for horses in the Southeast can assist those in the horse industry by maximizing their time and reducing costs. Management considerations to maximize forage and forage quality include implementing various grazing systems to preserve desirable forage species while avoiding losses due to overgrazing or trampling. In the next series, we will look at forages that can be toxic or harmful to horses in the Southeast.

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Equine Lacerations

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You don't have to be around horses long to realize that they can be accident prone. Lacerations or wounds are one of the most common equine emergencies. While many lacerations will heal well with basic care, some can permanently threaten your horse's soundness or can even be life threatening. It is always a good idea to have a laceration or wound evaluated by a veterinarian. They can determine if a wound involves other important structures such as joints or tendons, can decide if sutures are needed, and can prescribe antibiotics if necessary. Your veterinarian is also an expert resource throughout the wound healing process. Some medications should only be used at certain stages of wound healing and your veterinarian is the best person to determine the ideal treatment for each stage of wound healing.

There are certain lacerations or wounds that are especially concerning.

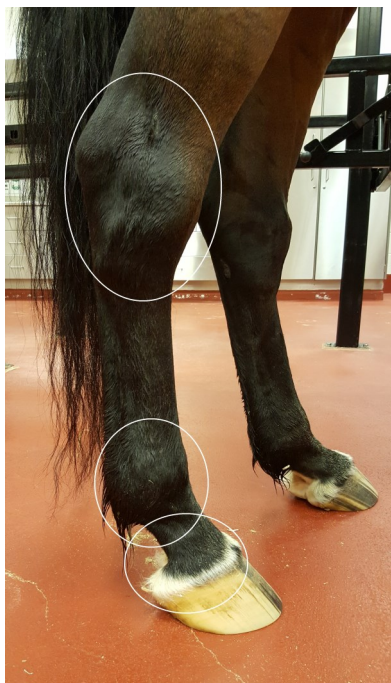


Figure 1— Photo Credit: Dr. McCracken

- Wounds that are over a joint or tendon sheath, may have penetrated the joint capsule or entered the sheath that surrounds a tendon. It can be very difficult to treat infected joints or tendon sheaths and early and intensive veterinary treatment and often hospitalization or surgery are needed to save your horse's soundness and life. If left untreated these infections can cause permanent severe lameness and may even result in the necessity for euthanasia. Figure 1 shows the location of important joints and tendon sheaths in the lower limbs. Figure 2 shows a wound that entered the coffin joint.
- Wounds that involve tendons or ligaments may have completely or partially transected these important support structures. These wounds may require surgery, casts, or splints to provide support to the leg as the tendon or ligament heals. Figure 3 shows a wound that completely transected the extensor tendons on the hind limb and required a splint for healing.
- Wounds that expose bone can lead to infection of a portion of the bone and the development of a sequestrum, which is a dead piece of bone that the body walls off and attempts to extrude. Note the exposed bone in Figure 3.
- Wounds with excessive bleeding need prompt veterinary care to stop the bleeding. Excessive blood loss can be life-threatening.
- Large deep wounds over the chest or abdomen may penetrate the thorax or abdomen and can cause a life threatening infection in these areas. Intensive veterinary care and hospitalization are needed for the treatment of these wounds.
- Wounds that are associated with lameness in the limb should always be evaluated as there could be additional damage to the limb.

What to do when your horse has a serious wound or laceration.

- Call your veterinarian. Describe the wound and listen to their instructions.
- Almost any wound can safely be cleaned with saline. You can buy spray cans of sterile saline in the contact lens section of your local drug store.
- Heavily contaminated wounds can often be cleaned with cold hosing, but make certain to check with your veterinarian first. Don't hose for too long as it can cause tissue swelling.
- Do not put any topical creams or other treatments on the wound until it is evaluated by your veterinarian. Some popular wound treatments are actually caustic to wound tissue and other products should only be used during specific stages of wound healing. Your veterinarian can recommend the appropriate topical medication to put on the wound.
- If there is severe bleeding, apply a firm bandage over the leg. If an upper body wound is bleeding excessively apply firm direct pressure till your veterinarian arrives.



Figure 2— Photo Credit: Dr. McCracken

Equine Lacerations, continued.

The best way to treat a laceration, is to never have your horse get one in the first place. Although there is nothing you can do to guarantee your horse will never cut themselves, you can manage their environment to minimize the risk.

- Eliminate or minimize the use of barbed wire fences and make certain any smooth wire fences are highly visible and properly maintained. These type of fences can easily cut and saw through your horses' limb especially if they become tangled in the fence.
- Keep your pastures free of debris, old boards, trash, farm equipment, and vehicles. These are all things that could easily cause a laceration.
- If T-posts are used in fencing, they should be capped. Uncapped t-posts can cause devastating penetrating wounds to the abdomen and thorax.
- Regularly inspect your barn, pasture, fencing, arena, and horse trailer for protruding nails, broken boards, sharp pieces of protruding wood or metal, or anything else that could cause injury to your horse.

Working with your veterinarian to ensure the best treatment of wounds and lacerations, practicing appropriate first-aid, and managing your property to minimize the chance of wounds and lacerations occurring in the first place are all ways to help ensure the health and soundness of your horse so they can enjoy many years as your active companion.



Figure 3— Photo Credit: Dr. McCracken

Adequate Starch Inclusion in the Equine Diet for High Intensity Exercise.

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Starch has progressively developed a bad reputation in the feed industry for horses. Fear of starch overload and its potential consequences of laminitis and/or colic, has started a robust marketing campaign for low-starch, high fiber feeds. Certainly, the horse's digestive system is not designed to effectively manage consumption of large amounts of starch at one time, however, starch is a highly digestible energy form and a vital component of the diet, especially for exercise, growth, production, and other physiological functions. Therefore, adequate starch must be included in the diet for horses performing high intensity exercise. There is, however, some evidence that horses with diseases, such as exertional rhabdomyolysis (ER) and polysaccharide storage myopathy (PSSM) may benefit from being fed a low starch diet (McKenzie et al., 2003).

Factors that can influence starch digestion in the small intestine:
(Julliand et al., 2006; NRC, 2007)

- Level of intake and rate of passage due to other meal components and particle size
- Starch source
- Processing of feeds, especially grains, which provide ample starch
- Animal to animal variability

Starch Digestion

Starch is a carbohydrate digested in the small intestine and broken down into glucose for use in ATP production (energy). If too much starch is ingested, the small intestine can become overloaded and any undigested starch moves to the cecum and large intestine for digestion. This is where starch overload can become a problem for the horse. Starch fermentation in the cecum increases lactic acid concentrations and causes a decrease in the pH of the hindgut. The drop in pH results in a rapid decrease of the favorable cellulolytic bacteria (Medina et al., 2002). This scenario can cascade into lactic acidosis and lead to clinical conditions such as laminitis and colic (Garner et al., 1975).

Mean starch levels in common feeds (NRC, 2007)

Grass pasture	3.5% starch
Legume hay	2.4%
Grass hay	2.8%
Steam flaked corn	72.3%
Oats	44.3%

Adequate starch inclusion in the equine diet for high intensity exercise, continued.

The small intestine's capacity to digest starch has been shown to be exceeded when feeding 3.5g of starch per kilogram BW per meal (Potter et al., 1992). This overload results in an increase of undigested starch moving to the hindgut for fermentation. Other researchers have suggested a lower upper safe limit of 1.1g/kg BW/meal and 2 g/kg BW/meal for starch intake, depending on the starch source (Kienzle, 1994; Vervuert et al., 2009). Cecal pH values 4-6 hours post feeding were observed to be lower in horses fed 1.8g of starch/kg/BW versus horses fed lower starch diet of 0.9g of starch/kg/BW (Warzecha and McCann, 2017). These differences in values would indicate a large individual variation among horses and variability to be expected with different starch sources i.e. different grains such as corn and oats (Radicke et al., 1991).

Most of the energy found in grains is in the form of starch. For any horse performing high intensity work, starch is necessary in the diet to sustain anaerobic metabolism in the fast twitch muscle fibers and to restore glycogen stores for future work. Therefore, grain or concentrates are a necessary component of the diet for performance and race horses. When feeding the horse, the goal is to minimize flow of fermentable starch to the large intestine, but to maximize substrate availability (glucose) for optimal performance. This goal can be achieved by feeding starch at a low level and often. When small amounts of oats were fed to horses, approximately 80% of the starch was digested in the small intestine. However, when larger amounts of oats were fed, starch digestion was closer to 58%, presumably resulting in greater amounts of starch reaching the large intestine for fermentation (Potter et al., 1992).

Starch in Horse Feeds

Grain	Starch content (%)		Starch digestibility ^a (%)	
	Mean	Range	Mean	Range
Oats	41.3	36.4–46.8	60.5	52.0–66.3
Barley	60.0	58.5–61.5	42.3	41.0–43.5
Corn	70.6	66.2–76.8	35.6	29.1–41.5
Premix	32.6	6.4–52.2	58.7	32.2–92.1

^aGives an indication of the amount of starch digested in 1hr, incubated at 39°C with α -amylase and amyloglucosidase. ^bCoefficient of variation for starch digestion assay = 1.45.

Figure 1. The average and range of starch content and in-vitro starch digestibility for oats (n = 29), barley (n=2), corn (n=20) and commercial premixed diets (n=35) (Richards et al., 2006)

It is important to note that just because a certain grain has a high starch content, does not necessarily mean the horse will receive that measure of starch when ingesting the grain. The research outlined in Figure 1 demonstrates the starch content of common grains found in horse feeds and their relative digestibility. It is well known that the starch content in corn is high at 70.6%, however, the digestibility of that starch in horses is only 35.6%. Compare that to oats, which is lower in starch content at 41.3% and yet has a starch digestibility of 60.5%.

Some feed processing methods can increase starch digestion of grains in the small intestine (Figure 2). Processing can include both mechanical (rolling, crushing, grinding), thermal (roasting, micronizing), thermo-mechanical (flaking, popping, extruding) and hydrothermal (steam rolling, steam crushing, pelleting).

Effect of processing on coefficient of pre-caecal starch digestibility of various feeds

Author	Treatment	Oats	Maize
Meyer et al. (1993)	Whole		0.290
	Crushed		0.470
	Heat processed		0.900
Kienzle et al. (1992)	Whole	0.800	
	Crushed	0.850	
	Ground	0.980	

Figure 2. Percentage of pre-caecal starch digestibility (Hill, 2007)

Starch levels are not required to be printed on feed tags. If information about starch is printed, it is usually labeled as nonstructural carbohydrates (NSC), which includes both the starch and simple sugar content of the feed. If the NSC is not on the feed tag, contact the feed company to obtain NSC information.

Muscle Glycogen and Exercise

Glucose from starch is important in glycogenesis, the synthesis of glycogen. Glycogen, which is stored glucose, can be stored in the muscle or liver. Glycogen storage is important in supplying the muscle the energy it needs to perform exercise. Muscle glycogen depletion is relative to exercise intensity and duration. If glycogen is low, intense or long-term exercise will be difficult for the horse to sustain (Hodgson et al., 2014).

Adequate starch inclusion in the equine diet for high intensity exercise, continued.

Horses fed diets high in soluble carbohydrates after strenuous exercise resulted in significantly greater muscle glycogen concentrations at 48 and 72 hours post exercise in comparison to diets fed with low soluble carbohydrates and a mixed level of soluble carbohydrates (Snow et al., 1987; Lacombe et al., 2004). Muscle glycogen repletion in horses is much slower than that in humans where muscle glycogen can be normalized with 24 hours on a high carbohydrate diet after strenuous running (Costill et al., 1981). Therefore, there is a much greater potential for the human athlete to engage in daily strenuous activity in comparison to the horse.

Muscle glycogen concentrations can be expected to deplete by 30-40% in Thoroughbred and Standardbred racehorses and by 50-75% in endurance horses in 80-160 km races (Hodgson et al., 1984; Harris et al., 1987; Hyyppä et al., 1997). In the aforementioned study, Lacombe et al. (2004) put horses through 3 days of strenuous exercise intended to deplete muscle glycogen stores by at least 60% of the initial values. Only horses on the diets high in soluble carbohydrates had muscle glycogen levels return to baseline values by 72 hours post exercise. Pagan et al. (2015) demonstrated similar results in Thoroughbreds using high (65.2% NSC), medium (46.5% NSC), and low (12.3% NSC) starch diets. At 72 hours post three-day exercise routine, muscle glycogen repletion was up to 94%, 94%, and 63% of initial values in the high, medium, and low starch diets, respectively. However, glycogen repletion could be dependent upon the type and duration of work being performed across several days. Snow et al. (1987) demonstrated that carbohydrate levels in the diet had minimal effect on glycogen repletion in the days to follow a one-day bout of flat racing. Research at Texas A&M University has shown that horses being fed diets with 997.6 g/d of starch versus diets with 553.7 g/d had higher muscle glycogen concentrations at 48 hours post exercise. A more rapid rate of repletion at 6 hours post exercise was also observed in horses fed the higher starch diet. These findings were after a single standardized exercise test in which the horses were worked to fatigue (Vonderohe, 2013). Therefore, it is important to provide a plane of nutrition that is adequate to high in starch for the recovering equine athlete especially when competing over several days.

It is worth noting that glycogen loading, often referred to as “carb loading” in human athletes, does not appear to have the same positive effects in horses when attempting to increase glycogen storage capacity 2 to 3 times greater than normal. Topliff et al. (1983) reported no notable improvement in performance of horses performing exercise tests with a 36% greater muscle glycogen concentration above resting values. Pre-exercise enhancement of muscle glycogen in Standardbreds fed high levels of carbohydrates was also shown to be minimally advantageous post exercise in comparison to a high fat and protein diet (Kline and Albert, 1981).

Athletic potential can be mediated by many factors including genetics, environment, and of course nutrition. Starch is a necessary component of nutrition for horses, especially those performing long or intense exercise. With a greater degree of knowledge and awareness, starch can be managed to supply the horse the needed energy to perform to its highest potential. Best management practices for high starch diets are outlined below.

Best Management Practices for High Starch Diets

- Monitor feeding practices closely, especially if other personnel are feeding the horses
- Keep concentrate meal size to 0.5% of body weight or less (NRC, 2007)
- Feed more than two meals per day and evenly space out the meals over 24 hours

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Selecting Hay for Winter Feeding

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Selecting hay for winter feeding is one of the most important things a horse owner will do for their horses. While there are many options and considerations to keep in mind when developing a nutritional plan, forage intake ranks as one of the highest. Depending on age and use of the horse, most nutritionists recommend horses be fed between 1-2% of body weight daily in some type of forage. Of course, time of year will influence the amount and type of forage consumed. During warmer parts of the year and with a high pasture quality, forage can come solely from pasture grazing. During the winter and late parts of fall and early spring, this forage intake usually comes from hay or alfalfa. For the purposes of this article and given that most horse owners in the south feed their horses grass hay, we will focus on grass hay selection.

What to look for:

Color

- Hay bales may become bleached on the outside during storage but a check of the interior can reveal the true hay color. Even bleached or yellowed hay can be good quality if harvested at the proper stage of maturity and if in good condition.
- Green color is desirable, but hay color is not a strong indicator of hay quality. Even nice green colored hay can be poor quality if over-mature at harvest. Other factors such as condition, maturity, and lab analysis are better predictors of hay quality.
- Dark brown, tobacco-like colors inside the bale may indicate occurrence of spontaneous heating caused by baling at excessive moisture levels. Animals may consume hay of this condition, but much of the quality has been lost.

Weed Content

- While some weeds can have forage value, some weeds can be toxic. Other undesirable weeds can become established on your farm seeded by the hay bale.
- A high weed content can cause increased incidence of mold in hay.
- Presence of sticks, rocks, garbage, or dead animals is not desirable.
- Broadleaf weeds and weedy grasses do not dry at the same rate as the forage species being harvested. This results in wet spots in bales causing mold and heating within the bale.

Hay Texture and Condition

- Texture and Condition relates to the feel and leafiness of the hay. Hay that looks and feels soft to the touch, has small stems, and high leaf content is desirable.
- Hay that has a harsh feel or hay that has hardened layers like a book is not desirable. This condition is often caused by spontaneous heating which results from baling hay at excessive moisture levels. The interior of bales in this condition should be inspected closely for presence of mold.
- Bales that appear compressed or “shrunk” may have been baled at excessive moisture. These should be inspected for mold.

Mold and Smell

- Hay should have a fresh odor. Musty odors or a dusty appearance indicate mold. Mold is caused by baling at excessive moisture levels or from wet spots in the hay.
- Hay that has undergone spontaneous heating caused by baling at excessive moisture levels may turn brown and have a tobacco-like odor. Animals may consume hay of this condition, but much of the quality has been lost.

Bale Type

- Bale type and bale size does not affect hay quality.
- Convenience, handling, and portability are the main considerations when choosing a bale type.
- Large square bales range from 750 – 1000 lbs
- Large round bales range from 600 – 1200 lbs
- Small square bales range from 45 – 65 lbs

Selecting Hay for Winter Feeding, continued.

Nutrient Contents

The below table contains several types of hay, along with the suggested crude protein, digestible energy, calcium, and phosphorus levels.

Table 5. Nutrient content of some varieties of grass hays (as fed basis)⁴⁰

Type/Harvest stage	CP (%)	DE (mcals./lb.)	Ca (%)	P (%)
Bahiagrass sun-cured, late vegetative	8.9	.77	.25	.19
Coastal bermudagrass 15-28 days 29-42 days 43-56 days	10.6 10.9 7.3	.87 .89 .79	.35 .30 .24	.24 .19 .17
Kentucky bluegrass full-bloom	8.2	.72	.24	.25
Smooth brome-grass mid-bloom mature	12.6 5.6	.85 .71	.25 .24	.25 .20
Kentucky fescue full-bloom mature	11.8 9.8	.86 .80	.40 .37	.29 .27
Oat hay	8.6	.79	.29	.23
Orchardgrass early-bloom late-bloom	11.4 7.6	.88 .78	.24 .24	.30 .27
Italian ryegrass late vegetative	8.8	.71	.53	.29
Sorghum, johnsongrass hay	6.7	.68	.80	.27
Timothy early-bloom mid-bloom late-bloom	9.6 8.6 6.9	.83 .80 .72	.45 .43 .34	.25 .20 .13
Wheat hay	7.7	.76	.13	.18

Sampling:

- It is generally acceptable to ask your hay producer before purchasing if the hay was tested and what the results were.
- Hay should be sampled for lab tests using a core sampler.
- Drill the sampling probe into the end of a square bale or through the side of a round bale. Collect cores for several bales from each hay source/where you have obtained your hay.
- Place the core samples in a labeled bag and send it to a forage testing lab.
- If you need assistance testing your hay, call your county extension agent and he/she will be glad to help and possibly provide the hay probe as well as provide you with information on where to send the sample.

Recovery of Pastures After Flooding

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Flood events are cause for concern for horse owners on many levels. Once you have addressed and determined the level of health support your horse needs following a flood, the next concern you need to address is managing your pastures.

Major flood events will vary in the degree of impact on pastures. This will depend on how the flood proceeded across the land, the soil types involved, water table levels and a range of other factors. In general, warm-season perennial species grown for pasture in Louisiana are pretty tolerant of flooding conditions. Bermudagrass has been reported to survive after submersion of 55 days while bahiagrass survived in a greenhouse trial after 84 days of submersion.

Water cover by itself is not the only determinant of degree of pasture damage. A combination of factors including soil texture (drainage), speed of water flow, water quality and water depth all contribute to varying levels of pasture damage. However, the longer the pasture is under water, the greater the potential for water logging damage. Light textured soils that drain freely will allow a speedy pasture recovery.

Heavy soils hold the water for a longer period after the flood has receded and extend the period of water logging. Providing the soil has not eroded, the quicker the water flow rates, the better the pasture recovery. The slower the water flows, the more sedimentation and the slower pasture recovery.

Moving water appears to provide more oxygen and is often at a lower temperature than stagnant or slow-moving water. Stagnant water can rapidly heat up and can cause scalding and rapid decay of the pasture plants. Pastures that have cool, highly turbid and constantly flowing water covering them for several days will often make a faster recovery than pastures with stagnant, warm, low turbidity water covering them. Generally, the deeper the water over the pasture, the slower the flow rate and longer period of inundation. This means a greater chance of silt and mud deposition leading to a slower pasture recovery.

When flood waters have receded, assess the damage and develop a plan for recovery. The biggest issue is that flood water and silt can be a source of pathogens. Livestock producers are strongly encouraged to work closely with their local veterinarian when determining which vaccination and feeding protocol to use to protect animals for possible health issues associated with grazing flooded pastures. Flood water and silt can also cause palatability issues with the forage grasses. **It is probably a good idea to clip the pasture to remove topgrowth and allow the plants to regrow.** Plants should not be clipped any lower than about 3 inches. Flooded plants may have weakened root systems and therefore may be slow to recover. When grazing flooded pastures this fall, graze lightly and try to leave at least 3 inches of top growth heading into the winter.

Flooding may also have an impact on the fertility of the soil in the pasture, as some nutrients may have been leached. However, it is probably not advisable to apply fertilizer this fall, since the growth of these warm-season pastures will slow between now and mid-October. Livestock producers should take soil samples of these affected pastures during the early spring months of 2018 and apply the recommended amounts of fertilizer. This should aid in the regrowth of these affected pastures as they begin to green up in April or May of 2018.

Another issue to be concerned about with flooding is the introduction of weeds to the pastures. Flooding can cause weed seeds to be transported from other areas and be deposited into pastures. Producers should monitor their pastures for weeds in 2018 and apply appropriate control measures when needed. Producers may want to contact their local Extension agent for assistance with weed identification and control measures.



Horses grazing in a semi-flooded pasture. Photo Credit– Wendy Moody

Recovery of Pastures after Flooding, continued.

While many horse owners are concerned about hazardous waste, chemicals, and other toxic compounds; floodwaters will generally dilute hazardous material to a tolerable level and it is unlikely that the surviving forage will serve as a reservoir. However it is advised to:

- Wait 2-4 weeks to allowing animals back onto a flooded pasture.
- Mow the surviving forage, leaving 3 inches of plant to regrow prior to grazing.
- Allow pasture to completely dry- this will prevent horses from drinking from pools of water that may contain residual levels of toxins.
- Provide clean drinking water.
- Check pastures for foreign objects including fencing material, metal objects, chemical containers, or anything else that a horse can injure itself on.
- Work with your veterinarian to determine proper pathogen and disease protection.
- In extreme cases of hazardous waste or chemical spill, horses should not be returned to that pasture until owners can be sure that there is no longer a health threat.

Unfortunately there is no quick and easy fix to return pastures back to their original condition prior to the flood. However with proper planning and attention to details, a safe environment can be created to serve your horse's forage needs. If you have any questions regarding safe grazing practices please contact your local veterinarian or extension agent.



Occasionally owners must get creative in finding ways to transport fresh hay and water to horses stranded in flooded conditions. Photo Credit– Dr. Walker

Perennial Peanut Hay for Horses

Courteney Holland & Dr. Leanne Dillard
Auburn University



Perennial Peanut Hay Photo Credit– Courteney Holland

What is perennial peanut?

Perennial peanut is a warm-season legume grown in South Georgia, North Florida, and parts of South Alabama. Perennial peanut is largely grown for hay production, most of which is being marketed to the horse industry. Perennial peanut is established by vegetative progradation using underground stems that are dug from a nursery field. One acre of a well-established perennial peanut nursery should yield enough underground stems to plant 20-30 acres at a planting rate of 80 bushels per acre. Yield potential ranges from 3 to 5 tons dry matter per acre in a well-established stand and with favorable climatic conditions. Cost of establishment can vary from \$200-\$500 per acre.

Is perennial peanut hay the same as “peanut hay”, or annual peanut hay?

Perennial peanut hay should not be confused with “peanut hay”, or annual peanut hay. “Peanut hay” is made from the residue after pod/seed harvest of the annual peanut. The leaves of the perennial peanut are similar to those of annual peanuts, however unlike annual peanuts, perennial peanut produces almost no seeds. Annual peanut hay should not be fed to horses under any circumstance as it is sandy, mostly stems, and dusty. However, perennial peanut hay has been found to be comparable to alfalfa in terms of nutritive quality, and was even given the nickname “Alfalfa of the South.” Due to the similarities between alfalfa and perennial peanut, a high value market exists for perennial peanut hay to horse owners in Alabama. This is because it is a more economical option compared to the expense of purchasing and transporting alfalfa hay.

Is perennial peanut safe to feed horses?

Not much is known about the nutritional value of perennial peanut for horses. Only two research studies have been conducted – Lieb et al., (1993) and Eckert (2008). In these studies, perennial peanut was found to be comparable to alfalfa in digestibility, crude protein, and fiber (Table 1). Several studies conducted at Georgia and Florida have found perennial peanut forage to be highly nutritious for goats, beef cattle, and dairy cattle. In the study by Lieb et al., (1993), voluntary intake by horses was greater for perennial peanut hay than for alfalfa hay. Perennial peanut hay has finer stem texture when compared to alfalfa hay making it more desirable for horses in terms of intake. Perennial peanut has a high nutritive value with in vitro digestibility percentages ranging from 60-70% and crude protein percentages ranging from 13 to 20%. Since perennial peanut is highly nutritious and very palatable to horses, it is best used as a supplemental feed (instead of being self-fed) to prevent overconsumption.

Table 1: Average composition of hays offered to horses (Eckert et al., 2010)

Dry Matter Basis	Perennial Peanut	Coastal Bermudagrass	Tifton 85 Bermudagrass
	------%-----		
Dry Matter	93	94	93
Ash	8	6	6
Acid-detergent Fiber	11	10	8
Neutral-detergent Fiber	46	73	77
DE, Mcal/lb	2.14	1.98	1.87
Apparent Dry Matter Digestibility	65	53	52
Dry Matter Intake	1.8	1.8	1.7

