Equine News

Department of Animal Science
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Hay and Pasture Production

Seeing the response of haying activity to the much welcomed rain that many of us have seen this spring as compared to the past several years, I posed a couple of questions to Daren Redfearn, OSU Forage and Pasture Management Specialist: Will haying late in the summer have any negative effects on the recovery of our pastures and how well have our pastures recovered from the successive years of drought? He provided the following thoughts.

With the spring rainfall, hay and pasture production has dramatically increased compared with the past few years. This includes wheat hay and wheat straw and other winter grasses such as tall fescue and annual ryegrass. Production of summer grass hay and pastures, such as bermudagrass and native grasses has begun. There are also numerous acres of summer annual forages that have been planted, so hay production from these should be common.

Even though hay production has increased, much of this forage production is best classified as mixed pasture or mixed hay. This is because of the fluctuations in temperatures this past spring and extended cooler, wetter weather that persisted into May. Across much of the region, there were many cool-season annual grassy weeds that took advantage of these growing conditions. There are numerous reports of these also invading summer grass hay fields and pastures. If these are present in the first cuttings of summer grass hay, the forage quality will lower. In later cuttings, these should not present any problems. It is also likely that there could be broadleaf weeds present unless they were controlled prior to harvest. Recently, johnsongrass growth has increased rapidly in many hay fields and pastures.

Based on the damage that these pastures have endured over the past 2 to 3 years, many are going to require an increased level of harvest management from now until they go dormant with the first killing frost. If they are harvested as hay this summer or grazed closely (shorter than 2 inches), they will need an adequate recovery period this fall to allow the desirable forage plants a chance to recover. There are two distinct negatives to grazing or harvesting a pasture short in the late fall. The first consequence of a late hay harvest or close grazing is slower regrowth the following spring. The second consequence is one we have recently observed with the invasion of cool-season annual grassy weeds.

We will continue to see slow forage and pasture growth over the next 2 months. This is due primarily to the lack of sufficient subsoil moisture to support growth without frequent rainfall events. What this means is that we have seen approximately 75% of the total production from summer grass pastures.

Excerpt from OSU ANSI-3981 Managing Grazing of Horses:

Forage Nutrient Utilization

A limited amount of research and a large amount of casual observation indicates forage diets can supply the nutrient needs of several classes of horses. Availability of sufficient amounts of high quality forage is usually the limiting factor.

Compared to cattle, horses have less ability to digest energy of high quality forages. When consuming high quality forage, horses will compensate for slightly lower digestion rates and faster passage rates by higher voluntary intakes of dry matter. Horses digest highly lignified forage (mature, stemmy forage) poorly. Energy digestibility coefficients for forages decrease from more than 50 percent to less than 30 percent as quality of forages decreases. Similar ranges of forage quality may affect energy digestibility in cattle 2 or 3 percent compared with the 10 to 20 percent in horses.

Protein digestibility in hays typically range from 50 to 70 percent. Protein digestibility of forages in pastures would be expected

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to be similar to hays of similar maturities. As with energy, digestibility of protein in forages can be expected to vary between forage species and within species at different stages of growth. One research trial comparing different hays calculated the protein digestibility of high quality bermudagrass at 57 percent, low quality alfalfa at 66 percent, and high quality alfalfa at 73 percent.

Protein digestion within the horse's digestive tract is also significant. Feed not absorbed in the small intestine travels to the hind gut. Protein in forage is better utilized when digested in the small intestine rather than the hind gut. Horses digest protein in low quality forage (stemmy, mature) mainly in the hind gut. Protein in low quality alfalfa is digested mainly in the hindgut, whereas almost $^{1}/_{3}$ of the protein in high quality is digested in the small intestine. Maximizing protein digestion in the small intestine is especially important when meeting needs of growing horses and broodmares.

Forages are also a good source of minerals and vitamins. Mineral content of forages vary between different forage species and in similar forages at different stages of growth and pasture locations. Agronomic practices such as fertilization alter mineral profiles of forages. As a general rule, balance calcium to phosphorus in forages for all classes of horses. However, the amounts of the two minerals may be deficient, especially for growth, exercise, and broodmare production. Additional minerals should be fed as a supplement at regulated intakes. Mineral supplement with equal parts of calcium and phosphorus can be supplied free choice, however, large variations of intake will occur irrespective of a horse's nutrient needs. Forages also are an important source of many vitamins, especially vitamin A containing compounds.
(Full article is available on-line via http://osufacts.okstate.edu)

Excerpt from OSU ANSI-3981 Managing Grazing of Horses:

Forage Nutritive Value

Forage nutritive value is determined by chemical analysis for crude protein, digestibility, and minerals. Visual assessments of forages may be made for foreign materials, leafiness, and color. Forage nutritive value is most strongly influenced by aspects under the direct control of the producer. These include choice of forage species, stage of maturity when harvested, and soil fertility. Grazing management can also affect forage nutritive value by influencing forage stage of maturity and leaf: stem ratios.

Visual appraisal of hay is the oldest and most widely used estimate of forage quality in hay. Forages have historically been evaluated on physical factors that include color, leafiness, maturity, smell, softness, and purity. Leafiness is a good indicator of forage nutritive value because nutrients in the leaves are more digestible, and leaves contain about twice the amount of nutrients as stems. Generally, if the forage is leafy with dark green leaves, contains few stems and seed heads, and is free of weeds, dust, and mold, consider this to be high-quality forage. Although these factors are important, they are difficult to quantify and communicate. By far, the largest single factor that affects forage quality is stage of growth at harvest or plant maturity. Forage that is more mature is less nutritious. For additional information on how these factors affect forage quality, see OSU Extension Fact Sheets PSS-2117, Forage Quality Interpretations and PSS-2588, Hay Judging. The only sure way to determine forage quality is by submitting a sample for chemical analysis from a reputable laboratory. For additional information on the process and benefits of forage testing, please see the Oklahoma State University Soil, Water, and Forage Analytical Laboratory website at http://www.soiltesting.okstate.edu/.

Stage of maturity may be the single most important aspect of management relative to forage nutritive value. Forage maturity and nutritive value are inversely correlated— as the forage increases in maturity, the nutritive value declines. This is due to an increased level of both cell wall (fiber) contents and indigestible lignin, most notably in warm-season grasses. Immature plants are highest in both nutritive value and digestibility. Dry matter production increases with stage of maturity and a balance between nutritive value and production must be achieved (Table 1). Harvest schemes for hay should be timed to obtain an optimum quantity of forage of acceptable nutritive value.

Table 1. Influence of maturity on yield and nutritive value of bermudagrass.

Week	Yield (tons/ac)	Leaf (%)	Crude Protein (%)	Lignin (%)
1	6.3	>90	21.4	<5.0
2	7.8	87.6	20.8	9.4
3	8.6	81.3	18.8	9.6
4	9.7	74.8	17.0	10.3
6	12.5	57.7	13.8	11.2
8	12.5	51.4	12.2	12.0

Revisiting a 2009 article reviewing a research project on hay quantity verses quality:

Research from grass hay fields harvested in either early July or August. **Grass left to harvest in August produced more tonnage, as you might expect with normal growing season of grass in the Midwest. Amounts produced in this particular trial were 16% higher when left to harvest toward the end of the growing season.**

However, tonnage is not the real issue for hay buyers. We purchase hay with expectation that it provides nutrition, mainly a source of digestible energy. When comparing the expected amounts of total digestible nutrients, the earlier harvested hay was estimated to produce about 3% more digestible nutrients on a per acre basis, even though the tonnage per acre was less. Each bale of the less mature grass that was harvested in early July could have as much as a 20% increase in energy value. Protein value was determined to vary similarly: Percent crude protein in the early July hay was 8% as compared to the same being harvested in late August at 5%. That means more value for the horse owner and a better source of nutrition for your horse. So, don't let quantity of forage on the field direct your hay buying decisions, especially when purchasing grass hay. Some of the more mature grass hay will be of very low value in terms of nutrition. Consider the immature hay as more valuable, and expect to reward those hay producers willing to harvest at less tonnage per acre if plants are in a less mature state when harvested.

Watering and Feeding during Hot, Humid Summertime

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How much water should a horse drink? Variability draws the answer to the too often used phrase of *it depends*. Some horses seem to be more like camels than equine with the ability to conserve losses. Others, if given free choice, seem more like a fish; what they do not drink they play with so much so that unlimited access results in more of a pond than a stall floor. You can usually expect water intake to double when the weather gets hot and humid from levels that the horse drinks in cooler times of the year, which, generally speaking, is around 10 to 15 gallons a day at a minimum for the 1100 pound horse. Horse response to exercise will increase fluid loss through sweat. Studies show a two mile bout of galloping can induce sweat fluid losses of over 2 gallons. Water loss through sweat needs replaced. It would be expected that a horse working throughout the day in hot environments to drink an additional 10 gallons or more per day. Big question is do you know what is normal for your horse, and are differences in voluntary intake related to your expectations based on environmental conditions and levels of use?

How can you tell if your horse sweats enough? The behavior of a horse will indicate how well it handles heat load. Other than a general lack of enthusiasm and desire to seek shade, the normal acclimated horse should handle our Oklahoma levels of heat and humidity with little concern. However, exercise in hot, humid weather raises the need for owner awareness. Body temperature, if it is normally around 101 degrees F, will increase a few degrees with exercise in hot environments. If not exercising, heart rates should be around 40 beats per minute, respiration rate 12 to 20 breaths per minute, and body temperature around 101 to 102 degrees F. Maximum heart rates during heavy exercise may reach 200 beats per minute or more, and respiration rates can triple or more. High levels of work can raise rectal temperatures to 104 degrees F plus or minus, which for any substantial length of time will be harmful. So it is important that the horse has the ability to decrease temperature quickly during recovery. Otherwise, heat stress becomes a big concern.

Under most conditions, you would expect that all the physiological measurements, i.e. heart rate, body temperature and respiration rate, to decrease dramatically within 5 minutes following heavy or prolonged exercise, and reach levels characteristic of resting values within 10 to 15 minutes after the end of exercise. Horses will handle exercising in hot weather more easily when physically conditioned and acclimated to the environment. If the horse is really hot from exercising, recovery is best done by hand walking in an area with air flow and away from direct sunlight. Cooling the body with water is recommended as long as heart and respiration rates have dropped to near the rates of resting heart rates, or even sooner under critical heat stress conditions.

Because humidity and air flow causes evaporation, your horse may sweat more than you think it does. So you really need to pay attention to its behavior and its respiration rate, heart rate and body temperature in times that you think it is not responding well to heat. If a horse appears to have a problem with not sweating enough, you should contact your veterinarian so sweat rate can be quantified. There are evaluation methods in which drugs are administered that cause a horse to sweat, and which may go to the extent of using absorbent pads to quantify losses. Anhydrosis, or the inability to sweat, is a problem with a small percentage of horses, but one that needs accurately diagnosed so you can determine the extent of use that the horse can provide.

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Are there any special feeding concerns for hot weather? Not really, there are increases in mineral electrolyte losses with sweat. Sweat contains an appreciable amount of sodium, potassium, chloride, magnesium and other minerals at smaller amounts. It is suggested that a balanced mineral premix is contained in the grain mix, which is the case for the majority of commercially prepared feeds, and that the exercising horse has access to a trace mineralized salt block. Just make sure the horse drinks water, as salt without water intake can dehydrate the body. Other than the need to replace mineral losses, hot weather may cause a small depression in the appetite of finicky eaters. Meals of grain may not be consumed as quickly or completely. However, because we usually exercise our horses more in the warmer times of year, the horse may want to eat more so appetite depression may not be an issue.

[Several short article fact sheets on horse management and production are available on-line and through your Oklahoma Cooperative Extension County educators. You can access horse-related fact sheets from www.ansi.okstate.edu/e-equine . In addition, you will find similar articles on related topics such as forage production and health within the on-line library of OSU Facts and available through your local Oklahoma Cooperative Extension Educator.]

A directory of county Oklahoma Cooperative Extension offices is available on-line: http://www.dasnr.okstate.edu/extension Offices have County Extension Educators working in areas of Agriculture, 4-H and Youth Education, and Family and Consumer Sciences.

Also, a nationally developed Cooperative Extension website developed for horse owner education is available for all to use. Several articles, learning lessons, and on-line video presentations are available at www.extension.org/horses .