

# WHAT IS THE IDEAL HAY FOR HORSES?

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## INTRODUCTION

Cleanliness, consistency, convenience, composition and cost-effectiveness are five important characteristics to consider when discussing the ideal hay for horses. Some of these characteristics are important to the health or performance of the horse, while others are important to the horse owner.

## CLEANLINESS

During exercise, the blood takes up oxygen and releases carbon dioxide in the lungs. When gas exchange in the lungs is limited, exercise performance is also limited; consequently respiratory health is very important to equine athletes. Inflammation of the respiratory tract can negatively impact respiratory function and hay can be a source of inflammatory substances. Breathable particles from hay that can cause respiratory inflammation include mold, pollen, small hay particles and small soil particles. A recent evaluation of various hay making conditions indicated that baling at 15% moisture reduced breathable dust particles and viable mold spores compared to baling at 25% moisture (Seguin et al., 2012). Application of propionic acid preservative to the higher moisture hay mitigated the increase in breathable dust and mold spores. This project also reported that rainfall post-cutting could increase the dust and mold spores in the hay. The presence of mold in hay has also been suggested to increase the incidence of gastric disturbances in horses.

Cleanliness also pertains to the presence of unwanted plants or other contaminants in the hay. Clearly the inclusion of potential poisonous plants should be avoided, however, plants such as thistles and nettles that have the potential to be physically injurious to the horse's mouth are also undesirable. Lesions in the oral cavity could affect feed intake as well as responsiveness to a rider's control via a bridle. Fortunately most horses will sort the hay and avoid these types of plants; however, if the hay is hand-fed, it is also possible for the person doing the feeding to be affected by the plant. While these plants are not likely to produce significant injury to the person, they could result in discrimination against the same hay or hay supplier in the future. Other contaminants that should be avoided include invasive weeds, trash and dead animals or insects, such as blister beetles which are poisonous to horses. Consumption of foreign objects, including baling twine, can lead to gastrointestinal obstruction and death.

## CONSISTENCY

Colic, or acute abdominal pain, can be brief and insignificant, or severe and life-threatening. Colic can be caused by something as simple as momentary accumulation of gas in the

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gastrointestinal tract or by impactions/obstructions that can only be resolved with abdominal surgery. According to a study conducted by the USDA (2006) colic accounted for 15% of all deaths in horses greater than 6 months of age. The cost of veterinary care for a horse with colic can be substantial, particularly if surgery is required, but even in less severe cases. A number of dietary factors have been associated with increased colic risk, including restricting or eliminating grazing, amount of concentrate (grain) consumed, and type of hay fed.

Dietary change has been suggested as one of the leading risk factors for equine colic. In a recent review of several epidemiological studies in equine colic, Durham (2013) suggested that a change in hay (variety, load) is a greater risk factor for colic than a change in concentrate type. It is not known whether the effect of changing hay type/load on colic risk is due to a change in the chemical composition (more or less nutrient dense), a change in the digestibility (more or less indigestible material), a change in eating behavior (rate of eating, intake of water) or the presence of some contaminant. But regardless of the mechanism, providing a consistent type of hay, in terms of both variety and quality is an important feeding goal in horse management. Some horse owners are unable to differentiate orchardgrass from timothy, but most can identify a change in hay based on color, texture and acceptability to their horses.

Consistency in hay type and quality is also important from a nutritional perspective. Many horse owners do not appreciate the large differences in nutritional composition between various types of hay. In urban and suburban environments, horses are often kept in boarding facilities where the horse receives a constant amount of concentrate every day regardless of whether the hay changes. Consequently an increase in hay quality can inadvertently result in an increase in nutrient intake, while a decrease in hay quality can reduce nutrient intake.

## **CONVENIENCE**

Convenience doesn't matter to horses, but it does matter to horse owners. Bale size is very important to many horse owners. Small rectangular bales are still preferred by many horse owners because they are easier to handle. Bales that weigh 50-60 lb can be managed by most horse owners, whereas bales that weigh more than 100 lb are more difficult to move. Stabled horses are usually offered hay twice a day, therefore bales that permit portion sizes of 5-15 lb are desirable.

While the traditional size bale is still popular with many horse owners, large bales (round or rectangular) can be a convenient means of feeding hay to horses that are kept in groups in dry lots or paddocks. Large bales that are mold-free and have been stored inside can be used for horses, whereas bales that have been stored outside do not meet the cleanliness requirements described previously. Large bales can become moldy in the field if they are not consumed rapidly. Therefore it is best if large bales are used for relatively large groups of horses that consume the bale in just a few days. However, if only one bale is available for many horses, some members of the group may not have adequate access. A solution to this problem is to use round bales that can be unrolled, or to place a large bale on the back of a trailer and spread the flakes through the field. In both cases, the horse owner must have the proper equipment to move the large bales and also to clean up the wasted hay in the feeding area. Use of a feeder reduces

waste and reduces the amount of hay used per month (Martinson et al., 2012). Feeders designed for horses are preferable to feeders designed for cattle.

Many horse operations do not have the trucks or trailers to move large amounts of hay, making delivery service a major convenience. Some horse owners are willing to pay a higher price for the convenience of someone else delivering and stacking their hay! Conversely, some horse owners have limited storage space and the ability to pick up small amounts of hay at a time is important to them.

## COMPOSITION

The most effective feeding horse feeding programs match the nutrient composition of the hay to the nutrient requirements of the horse. The nutrient needs of a lactating thoroughbred mare are much different than the nutrient needs of a 12 year old gelding that is ridden two or three times a week. Table 1 shows the daily calorie, protein, calcium and phosphorus requirements of several different types of horses. Mature horses used for light exercise (1 to 3 hours per week) and moderate exercise (3-5 hours per week) are low compared to the needs of a lactating mare. Although the absolute amounts needed by a young growing horse are not higher than mature horses in moderate work, they are much higher in relation to body weight. Consequently, mature horses that are sedentary or are used for light exercise can be fed hays with lower nutrient density than broodmares, growing horses or elite equine athletes.

**Table 1: Daily nutrient needs of different classes of horses (NRC, 2007)**

	Calories (Mcal digestible energy/d)	Crude Protein (grams/d)	Calcium (g/d)	Phosphorus (g/d)
Mature Gelding-Light Work*	22.6	790	34	20
Mature Gelding-Moderate Work#	26.3	870	40	24
Lactating mare (1250 lb)	35.8	1730	67	43
Yearling (10 months) (750 lb)	21.2	880	44	25

\* Light work = 1-3 hrs/wk; walking & trotting; 1250 lb

# Moderate work = 3-5 hrs/wk; trotting & cantering; 1250 lb

The nutrient composition of hay is affected stage of maturity and forage specie. Early maturity hays are usually higher in calories, digestibility and protein and lower in neutral detergent fiber (NDF) and acid detergent fiber (ADF) than late maturity hays. Legumes are usually higher in calories, digestibility, protein, calcium and palatability than grass hays. In general, the most nutrient dense (nutrients/lb) hays are the early maturity legumes and the least nutrient dense hays are the late maturity grasses.

Table 2 shows how effectively different types of hay meet the calorie needs of four different types of horses: a mature horse in light work, a mature horse in moderate work, a lactating mare and a 10-month old yearling. For this example, I estimated that the horses would eat 2% of their body weight in hay per day (2 lb/100 lb of body weight) and that the adult horses weigh 1250 lb and the growing horse currently weighs 750 lb but it expected to mature at 1280 lb.

**Table 2: Percentage of calorie requirements met by hay fed at 2% of body weight to different types of horses**

	Mature Horse* Light Work	Mature Horse* Moderate Work	Lactating Mare*	10 month old yearling#
Pre-bloom alfalfa	122%	105%	77%	78%
Full bloom alfalfa	105%	90%	66%	67%
Mid maturity alfalfa- timothy mix	110%	95%	70%	71%
Late maturity timothy	88%	76%	56%	57%

\* current body weight of 1250 lb;

# current body weight of 750 lb, expected mature body weight of 1280 lb

When looking at Table 2, it becomes clear that some hays are better suited to certain types of horses than others. Feeding pre-bloom alfalfa at 2% of body weight results in a calorie intake that is about 20% above the requirement for a horse in light work. These extra calories would be stored as fat. Eventually, using this hay at this rate will result in a very fat horse. If this hay was fed at a rate to meet the calorie needs of the horse in light work, intake would have to be restricted to approximately 1.6% of body weight. Restricting feed intake is certainly possible but it may lead to some undesirable behaviors such as wood chewing. A better choice for the horse in light work would be to feed the full bloom alfalfa at a slightly restricted rate, or to feed the late maturity timothy, either at a higher rate or in combination with a commercial concentrate. By feeding a small amount of commercial concentrate, the trace nutrient needs of the horse (trace minerals, vitamins) will be met.

For the lactating mare and the growing horse, the late maturity timothy hay is the least desirable choice. At this rate of intake, relatively large amounts of concentrate would be needed to meet calorie needs for growing horses and lactating mare fed late maturity timothy. If only hay was available, these horses would have to eat almost 4% of their body weight to meet their calorie requirements, which is very unlikely. The pre-bloom alfalfa or the mid maturity alfalfa-timothy mix hays come closer to meeting the calorie requirements for broodmares and growing horses than the late maturity timothy. Because these hays meet a larger percentage of the calorie needs, it will be possible to use less concentrate.

The discussion thus far has focused mainly on the energy values of different hays. Different hays also vary in protein concentration, calcium concentration and calcium:phosphorus ratios. When alfalfa hay is fed to mature, non-breeding horses, protein and calcium intakes almost always exceed the requirements. Alfalfa-grass mixes offer more moderate protein and calcium concentrations and may be preferred by many horse owners. Conversely if lactating mares or

growing horses are fed mid or late maturity grass hays, protein quantity or quality (availability and balance of essential amino acids) may be low. The use of grass hays for lactating mares and growing horses often results in the need for higher concentrate intakes; and it can also result in the need for more heavily fortified concentrates.

In the last few years there has been increased interest in the carbohydrates in horse hay, particularly the nonstructural carbohydrates or “sugars”. There is a small percentage of the equine population that is insulin resistant and thus sensitive to consumption of feeds that are high in starch or simple sugars. In many cases the horses that are insulin resistant are older, inactive and overweight. For these horses, hays that are low in starch and sugars are often recommended by veterinarians. However, low starch and sugar hays are not necessary for most horses.

### **COST-EFFECTIVENESS**

The cost of hay is often a concern of horse owners. But it is important to realize that “cost” and “cost-effectiveness” are not synonymous! Cost is best thought of as price per ton, but cost-effectiveness takes into consideration the value of the hay in relation to the total diet cost. Hays with higher nutrient densities are more valuable because they reduce the amount of supplementation that is needed in the total diet. In addition, hays with higher nutrient densities are usually more palatable and more digestible, so there is less waste.

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