

Decreasing the Costs of Feeding Horses

ANR-0849

Equine Nutrient Requirements

Horses need the same basic nutrients for life as any other animal—energy, protein, water, vitamins, and minerals. Specific amounts of these nutrients needed by the horse vary according to the horse's size and physiological state. Horses that are breeding, pregnant, lactating, growing, or working will have different needs from a mature, inactive horse.

Protein and energy are usually the most expensive nutrients in the horse's diet. Grains and forages contain carbohydrates, which are the main energy source in the horse's diet. Dietary fat also is a concentrated energy source (fats furnish 2¼ times as much energy per pound as carbohydrates) that can be used by the horse. But, most common feeds for horses contain relatively low levels of fat.

The digestible energy and crude protein requirements for horses during different physiological states are listed in table 1. It is not important that you know exact nutrient amounts needed by the horse, but you should understand the general trends presented in the table. For example, relative to their body size, weanling foals have a high energy requirement for growth. To calculate energy needs per kg body weight, simply divide Mcal required by body weight. For example a 4-month old weanling needs about 0.08 Mcal DE per kg body weight. Because their small size prevents consumption of large amounts of feed relative to their high requirement, their diet should contain a concentrated energy source. As foals mature, their growth rate decreases, their consumption increases, and, consequently, the energy concentration needed in their diet decreases. Lactating mares also need

Table 1. Daily Nutrient Requirements for Horses with a Mature Body Weight of 500 kg (1,100 pounds)

	Body Weight (kg)	Digestible Energy (Mcal)	Crude Protein (g)
Mature horse, maintenance	500	15.2	540
Breeding stallions	500	21.8	789
Pregnant mare, 9 months gestation	534	19.2	797
Pregnant mare, 11 months gestation	566	21.4	893
Lactating mare, foaling to 2 months	566	31.7	1535
Lactating mare, 3 months	500	30.6	1460
Lactating mare 6 months	500	27.2	1265
Mature horse, light work ^a	500	20.0	699
Mature horse, moderate work ^b	500	23.3	768
Mature horse, heavy exercise ^c	500	26.6	862
Weanling, 4 months	168	13.3	669
Weanling, 6 months	216	15.5	676
Yearling, 12 months	321	18.8	846
Yearling, 18 months not in training	387	19.2	799
Yearling, 18 months in training	387	22.1	853
2-year-old, not in training	429	18.7	770
2-year-old, light training	429	21.8	829
2-year-old, heavy exercise	429	27.9	969

^aExamples are horses used in Western and English pleasure, bridle path hack, equitation, etc.

^bExamples are horses used in ranch work, roping, cutting, barrel racing, jumping, etc.

^cExamples are race training, polo, etc.

Source: National Research Council. 2007. Nutritional Requirements Of Horses, 6th edition. Washington, D.C.: National Academy Press.

a fairly high dietary energy concentration for milk production. Horses doing moderate or intense work have higher energy requirements than inactive horses, to compensate for the energy used during exercise.

Protein, like energy, is found in grains and forages. But, protein is used mainly for increasing muscle mass or growth. Protein can be converted to energy, although the conversion is very inefficient and costly. So, protein should be used mainly for growth, not to provide energy to the horse. Table 1 shows the grams of crude protein needed by the horse daily in different stages of growth or production. Again, look at the trends in the table, rather than the exact figures. Weanlings need the highest protein concentration in their diet, (about 4g protein per kg body weight) owing to their rapid growth and small consumption rates. For these same reasons, protein quality (reflected by the amounts of essential amino acids that make up the protein) of the diet of the growing horse should be high. As the horse matures, the amount of protein required in the diet per kg body weight rapidly decreases. Lactating (nursing) mares, especially during the first 2 months of lactation, have high protein requirements (about 3g protein per kg body weight) because they have high levels of milk production. Note that the crude protein requirement for a mature horse at maintenance is low (1g per kg body weight), and mature working horses do not need high protein concentrations in their diet. Very little protein is used by the horse during work, and any extra protein needs are met with the increase in feed needed to meet the horse's increased energy demands.

Horse owners often spend more for feed because they don't understand the protein and energy needs of horses.

A mature horse that is too thin needs to have more energy in its diet to gain weight. Increasing the crude protein level of its diet will not make the horse gain weight more quickly. Similarly, a mature working horse needs an increased level of energy in the diet but not more protein. Because feeds are identified and sold on the basis of the amount of crude protein they contain, many horse owners will purchase an expensive high protein feed for their thin or working horses. Unless this high protein feed also contains a high carbohydrate or fat concentration (some of the more expensive feeds do increase protein and fat together), you end up feeding as much of the expensive high protein diet as you would need of

a cheaper, lower protein feed that still meets the horse's energy requirements. Also, most excess protein in the horse's diet is metabolized to urea, which is excreted in the urine. The more excess protein in the horse's diet, the more urine is produced in an effort to rid the body of excess urea. So, horses on diets that are too high in protein not only cost more to feed, but they also have increased bedding costs and stall cleaning chores.

Small amounts of vitamins are necessary for the health of the horse, and most vitamins are found in adequate amounts in the normal feedstuffs or are synthesized in the horse's gut.

Vitamins E, K, and C usually are found in sufficient amounts in average quality grains and forages to meet the horse's needs. Vitamin D is provided by sunshine, so only horses kept indoors for long periods of time would need additional vitamin D. B-complex vitamins are made in the horse's intestinal tract, and many feeds also contain fairly large amounts of these vitamins. Severely weakened or stressed horses may benefit from additional B-complex vitamins, but healthy horses show no response to extra B-complex vitamins in the diet. Because the B-complex vitamins are water soluble, excess amounts are excreted in the horse's urine. Supplementation of B-complex vitamins usually results in a waste of feed money.

Vitamin A is the only vitamin that may be deficient in the horse's usual diet. Vitamin A is formed in the body from a substance called beta-carotene. Beta-carotene is found in all green forages at levels above the horse's needs, and the horse will store vitamin A in the liver. So, if the horse has access to green forages for 4 to 6 weeks, it will store enough vitamin A to last 3 to 6 months. But, if the horse is on a continuous diet of forages deficient in beta-carotene, it may need supplemental vitamin A in the diet. All commercial, balanced horse feeds will contain supplemental vitamin A. Excessive amounts of vitamin A can be toxic, leading to skin and bone problems.

Horses obtain most of the minerals that they need from pastures, forages, and grains, and excessive amounts of minerals can be toxic or fatal. Usually phosphorus (P), calcium (Ca), and salt (NaCl) are the minerals that are most important when feeding horses. Improper ratios of Ca and P in the diet cause more nutritional problems than any other minerals. The minimum Ca:P ratio should be 1.1 Ca to 1 P.

The maximum recommended ratio is 2.5 to 1. The important point to remember is that the Ca intake should always be higher than the P intake. Adequate amounts of NaCl are found in the balanced commercial horse feeds, but usually you should provide supplemental salt to the horse on a free-choice basis. A trace mineralized salt block generally provides any supplemental minerals needed by the horse.

Water is probably the most important nutrient to provide the horse. Approximately 70 percent of the horse's body weight is made up of water, and this amount cannot change greatly without causing illness or death of the horse. At a temperature of about 50°F with normal feedstuffs, the horse will drink about 12 gallons of water daily. The water needs of the horse increase if the horse is fed very dry feeds, if the ambient temperature increases, if the horse is working, or if it is a lactating mare. At 100°F, a working horse or a lactating mare may consume more than 25 gallons of water daily. Without an adequate water intake, the horse will go off feed and may colic or die. Clean, fresh water should be available free choice to the horse except when the horse is hot after exercise or extremely thirsty. In these situations the horse's water intake should be restricted, and the horse should be allowed to drink water gradually.

Horses can obtain the nutrients they need through a wide variety of grains, forages, and grain by-products. Extension publication ANR-0424, "Pasturing And Feeding Horses," discusses common feed ingredients found in the South and the nutritional value of these feedstuffs.

Reducing Feed Costs

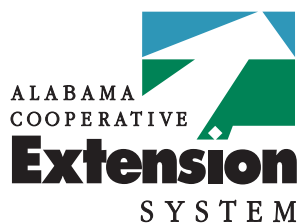
A number of feeding management practices can reduce your feed costs and still meet your horse's basic nutrient requirements.

- **Make good quality forage the basis of your feeding program.** Horses evolved as grazing animals, and their digestive system is designed to use forage. All horses should get at least 1 percent of their body weight in long roughage (hay or pasture) each day. Using forages in your feeding program can save money in a number of ways. Generally, pasture and hay are less expensive than grains. Increasing forages in the diet usually decreases chances of colic and laminitis (founder), because the roughage adds bulk to the diet and dilutes high energy feeds,

preventing rapid fermentation of grains in the gut. And, horses with adequate forage usually do not chew fences and stalls, decreasing repair costs. Finally, most mature horses can meet their maintenance requirements on good quality forage alone, without additional grain.

- **Purchase hays by weight and quality and in bulk, if possible.** Compare the cost of hay per ton to the cost by the bale. A forage test is the only way to accurately determine the nutritive value of hay. But, no matter what species of grass or legume makes up the hay, good quality hay usually is green, has a soft texture, and is free of dust, mold, and weeds. Maturity of the hay is the main factor that affects nutrient content. More mature hays are less digestible, so look for a high proportion of leaf (immature) compared to stem (mature).
- **Read the guaranteed analysis on your feed label.** The guaranteed analysis on the label should meet the nutritional needs of your horse. If the guaranteed analysis greatly exceeds the nutrient requirements of your horse, you are buying nutrients that the horse wastes. The label must list the percentages of crude protein and crude fat and the maximum percent crude fiber. To roughly estimate percent carbohydrates in the diet, sum the percentages of crude protein, crude fat, and crude fiber, add 10 percent for moisture content of the grain, and subtract this number from 100 percent. The more crude fiber a feed contains, generally the less carbohydrates it will provide. Feeds with a high crude fat content usually are more expensive. But, because fats provide more energy than carbohydrates, you may feed less of the feed, offsetting the cost. If the label indicates that the feed is "balanced," the feed contains the proper amount and proportion of all nutrients required for the stated purpose (growth, lactation, etc.). All you add is hay or pasture and water. If the feed is labeled "complete," the feed is nutritionally balanced and formulated to be fed as the horse's only nutrient source, except for water. However, even though complete feeds contain fiber, the horse should still get at least 1 percent of its body weight in long roughage each day to keep its digestive tract functioning properly. For more information about feed labels, see ANR-1354, "Reading the Feed Tag."

- **Check the feed ingredient list on the feed label.** If the feed is for weanlings or lactating mares, which require high-quality protein, check for a high-quality protein source in the feed, for example, alfalfa meal, soybean meal, animal protein, or milk protein.
- **Do not waste money on additional supplements, tonics, conditioners, etc.** If your feed is labeled balanced or complete, the horse does not need, and cannot use, all the extra nutrients. Although the horse can excrete most excess nutrients from its body, some vitamins and minerals can be harmful in large amounts.
- **Feed to meet the requirements of your horse.** Once your horse has obtained the correct body weight, feed the horse to keep it at this weight. It takes more feed and costs more money to put weight on a thin horse than to maintain a horse at the proper body condition. On the other hand, overfeeding a fat horse easily can lead to colic and founder.
- **Maintain an appropriate deworming schedule.** You want to feed the horse, not the worms. Perform fecal egg counts to determine deworming intervals for individual horses and choose a deworming product that effectively kills the parasites found on your farm. If fecal egg counts indicate that your dewormer is ineffective, switch to a different drug class that kills parasites through a different method of action. Do not just switch brand names that use similar deworming compounds.
- **Maintain a regular schedule of dental care.** The horse's teeth should be examined yearly for sharp points on the molars or other problems. A horse with dental problems does not chew its feed properly and wastes feed. The cost of the dental care will be more than recovered by savings from increased feed digestibility and decreased waste.
- **Feed frequently and at regular time intervals.** Food rapidly passes through the horse's digestive tract, and large grain meals can easily overwhelm the tract. If the grain required in any one meal is more than 8 pounds, split the meal into two feedings. It is important to let some time lapse between feedings to prevent overloading the digestive tract.
- **Feed horses as individuals.** This is especially important for horses that have a high grain requirement. If you must feed horses in groups, use individual feeders and provide one additional feeder for every four horses to allow timid horses an extra feeder if they are pushed away from their meal. When feeding horses in groups, scatter the feeders in the pasture. Placing feeders in a tight circle or straight line increases the chances that a boss horse can control several feeders. Feed rapidly so that all horses can begin eating at the same time. Extremely timid horses or extremely aggressive horses should be removed from the group and fed individually.
- **Measure horse feeds by weight rather than by volume.** This reduces feed waste and ensures that horses are getting a consistent amount of feed. The same volume of different grains can be 2 to 3 times different in weight and nutritive value. For example, a bushel of oats weighs approximately 32 pounds, and a bushel of corn weighs 56 pounds. Weighing feeds and gradually making any changes in feed types can greatly reduce digestive problems in horses.



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