



Feeding Horses

When you feed your horse, take into account its age, weight, work and growth to determine its diet.

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Some horses are easier to feed and require fewer nutrients than others. Other horses are very difficult to feed and require special attention. It is important to know how to feed your horse and to make sure it gets all the nutrients it needs.

Understanding the function of the horse's gastrointestinal (GI) tract is critical for maintaining its health and preventing conditions such as laminitis.

Gastrointestinal (GI) Tract

Forty-five to 72 hours is required for food to completely pass through the digestive tract of the horse. A horse's GI tract

consists of:

- the mouth
- esophagus
- stomach
- small intestine
- cecum
- large colon
- small colon
- rectum.

The stomach and the small intestine make up the foregut of the horse; the cecum, large colon, small colon and rectum make up the hindgut of the horse. The majority of starch (the principle component of cereal grains metabolized for energy), protein, fat, vitamins and minerals are digested and absorbed in the foregut (primarily in the small intestine) by enzymes and other digestive substances secreted into the small intestine by the pancreas, liver and cells making up the wall of the small intestine.

The hindgut contains microbes, which are bacteria and protozoa capable of digesting dietary fiber supplied by roughages in the diet. The horse does not produce enzymes which digest fiber, but uses microbes to break down fiber. Microbes enable horses to utilize fiber quite well.

Horses require fiber in their diet for the gut to function normally

It is recommended that the diet contain no less than 1 percent of body weight of roughage such as hay, pasture, etc. For example, a 1,100 pound horse requires at least 11 pounds of roughage.

It also is important not to over feed grain to horses because this can cause digestive upset such as colic. When too much grain is fed, much of it is digested in the small intestine. The rest spills into the hindgut where microbes digest it rapidly, producing large amounts of gas and acid, and endotoxin all of which can cause discomfort, colic and, in some cases, laminitis. It is recommended that horses not be fed more than 1 percent of body weight from a grain source.

In addition, horses should have constant access to plenty of fresh, clean water for the gut to function normally.

The horse's GI tract is a delicate system. Feeds should be selected not only for their ability to meet the animal's nutritional requirements, and compatibility with the horse's GI tract.

Five types of nutrients

A horse requires five types of nutrients. Each nutrient has an important role in the horse's body and is needed to keep the horse healthy.

- Energy nutrients (such as carbohydrates and fats),
- Proteins
- Vitamins
- Minerals
- Water

Water is the greatest single part of nearly all-living things. Water performs many tasks in the body. It makes up most of the blood that carries nutrients to cells and takes waste products away. In addition, water is the body's built-in cooling system; it regulates body heat and acts as a lubricant. A horse drinks about 10 to 12 gallons of water daily depending on the work it is doing. In hot weather, a horse may drink up to 15 to 20 gallons of water. In very cold weather, water heaters may be needed to prevent the water from freezing.

Energy in feeds is measured in Mega calories (Mcal) of digestible energy (DE). Energy nutrients are the body's fuel and make up the bulk of the diet. After food is digested, blood carries its energy to the body. Energy nutrients power muscle movement to walk, breathe and blink eyes. (At the same time, this energy maintains body temperature).

Carbohydrates are the main energy source for all animals. Carbohydrates are complex compounds made up of carbon, hydrogen and oxygen. Cellulose (carbohydrates found in hay and grass) is one of the more complex carbohydrates. Horses can digest cellulose (grass and hay) because they have small microbes in their large intestine (cecum) that can break it down. Fats or oils are another source of energy. Like carbohydrates, fat is made up of carbon, hydrogen and oxygen and also provide energy for movement and heat. Energy in fat is more concentrated than energy in carbohydrates. Fat has 2.25 times more energy per gram than carbohydrates. Never feed more than 10% of the diet in fats/oils.

Protein supplies material for body tissue. During digestion, proteins break down into amino acids. Amino acids build bodies; they enter the blood stream from the intestine, and blood carries amino acids to all parts of the body. They form body tissue. Proteins eventually become muscle, internal organs, bone and blood. Skin, hair, hooves and many other parts of a horse also are made of protein. Protein not needed to maintain or build a horse's body is either converted into energy or passed through the digestive system. Total protein in feeds is measured by crude protein (CP).

Vitamins are needed in much smaller amounts than other nutrients, but they are just as vital. Each vitamin has a different job in the body. Some vitamins are in the food a horse eats while others are produced inside the horse. Depending on its diet, a horse may need vitamin supplements. Supplements usually are not necessary if a horse is allowed to graze on grass.

Small amounts of minerals usually are needed. Iron, copper, phosphorous, calcium and magnesium are examples of minerals that are important for a horse's body. Without iron, blood cannot carry oxygen to the body's cells. Without calcium and phosphorous, bones and teeth will not form properly. Calcium and phosphorous should be fed in a ratio that ranges from 3:1 (three parts calcium for each part of phosphorous) to 1:1. An imbalance of these minerals can cause developmental bone disease in young, growing horses.

Types of feeds

Your horse can get its essential nutrients from many types of feed.

Roughage/Forage Roughage, found in hay or grass, is the bulk of the horse's food. Grass or alfalfa hay, or a combination of the two, are good sources of roughage. Grass hay is generally higher in fiber and dry matter than alfalfa, but alfalfa may be higher in protein, energy, vitamins and calcium. Hay can be long-stemmed in hay bales, or come bagged in cubes, or pellets. Many horse owners feed grass hay or straight alfalfa or a combination of grass and alfalfa to their horses. Grasses commonly used as hay are brome, orchard, and timothy.

- Long stem hay is the traditional baled hay. It is cut, cured, and baled. It can be bundled in 50- to 80-pound square bales or large, round or long square bales that can weigh tons.
- Hay cubes are about an inch wide and 1- to 3-inches long.

- Hay pellets are ground hay compressed into 2 inch by ½ inch pellets.

Hay

Horses need good quality hay. It should be bright green, leafy and fine textured, with a fresh, pleasant aroma. Musty hay or other indications of mold or heating, and dust, weeds and other foreign material in hay can be unhealthy for an animal. Color is an indicator of quality and nutrient content; good hay is a bright green.

Most nutrients in hay are in the leaves, and leafy hay is a valuable source of food. Leafiness is influenced by the kind of hay, its maturity when cut, the weather conditions while growing and curing the hay, and curing procedures of the hay. Dust is objectionable in any feed for horses. It not only reduces the taste of the hay, it also aggravates respiratory problems. Sprinkling or dunking dusty hay in water can reduce dust. Avoid feeding moldy or dusty hay. In the field, heavy rain can break off drying hay leaves and leaches energy and protein from the hay. Hay baled before it is dry enough will lose nutrients through fermentation, or heating in the bale. This sometimes starts fires through spontaneous combustion in barnyard stacks of stored, baled hay. This type of hay is unacceptable for horses.

Pasture

Good pasture or grass that an animal can graze can be an economical food for horses, but pasture must be maintained. If animals are allowed to graze on a pasture too long, the grass may be killed.

Some of the basic requirements for a good pasture are:

- a supply of appetizing plants such as grasses or legumes
- a paddock or stall to house your horse for part of the day
- only use pastures for daily exercise and grazing
- a year-round supply of fresh, clean water
- shelter from wind, cold and sun
- safe, durable fencing
- no poisonous plants
- no equipment, holes or other dangerous materials in the pasture
- grain for highly active horses or if the quality of the grass is poor.

Well-managed pastures reduce feed costs and provide energy, protein, vitamins and minerals to animals. An exercise lot with a few blades of grass is not a pasture; such a lot, or overgrazed pasture, is not a source of nutrients and can be a serious source of internal parasites. When a grass stand becomes too thin, overgrown, coarse or unappetizing to a horse, it should be clipped or mowed. Lush pasture forages can act as a laxative in early spring and may cause founder. Introduce horses gradually to pastures by slowly increasing their daily grazing time.

Concentrates

Small grains, such as corn, oats and barley, are known as concentrates. Concentrates are lower in fiber and higher in energy than roughages. The grain should be clean, mold- and insect-free, with a bright color. Grain quality is just as important as hay quality. Grains may be cracked, steamed or rolled, but, if ground too finely, may cause respiratory problems or colic. Oats are the safest and easiest grain to feed with hay because it is high in fiber and low in energy, and higher in protein than corn. Corn has the highest energy content of any grain and can put weight on a horse quickly. It can be fed on the ear, cracked, rolled or shelled. Barley is an intermediate source of energy and protein content. All grains are low in calcium, but high in phosphorus.

Supplements

Protein and vitamin-mineral supplements are added to the diet to increase the diet's concentration. Grains are energy supplements to a high forage diet. Only add supplements to the diet if something is missing. Some protein supplements are oilseed meals, soybeans, cottonseed, linseed (flaxseed) meal, peanut meal, sunflower seed meal and rapeseed (canola). Vitamin and mineral supplements should only be added to the diet if the horse is deficient. Generally, the only minerals of concern in feeding horses are calcium, phosphorus and salt. In some geographical areas, lack of selenium and, in growing horses, copper and zinc, is a concern. Other minerals are likely to be present in adequate amounts in a normal diet.

Commercial grain mixes or complete feeds

Concentrated mixes are cereal grains with supplements added to increase the specific nutrient content of the mix. A complete feed is a grain mix that is high in fiber because it contains a forage or high-fiber byproducts feed such as hulls. Complete feeds are held together, usually by extrusion (puffed up like dog food) or by forming into pellets. If you are feeding a commercial complete feed, you will not need to feed hay (follow the label for feeding recommendations). There are also feeds for specific classes of horses. Some feeds are specially formulated for young, growing horses (weanlings and yearlings); and for geriatric (aged) horses that are old and have specific nutritional needs. Some commercial feed companies make pre-mixed, convenient, easy-to-use formulated feeds for horses that are on different hay diets such as grass or alfalfa. You should not need to add any other supplements to the diet. These feeds may be more expensive than developing your own ration, but they are good for the owner who does not want to spend time to research their horse's diet.

Feeds from commercial companies have an analysis attached either as a separate tag or printed directly on the container, or that gives guaranteed minimum and/or maximum amounts of certain nutrients.

Nutrient requirements for different horse. The nutrient requirements of a horse vary with its age, weight and the amount of work it performs. Good quality hay is sufficient feed for a mature horse that is ridden very little. With an increase in work, grain should be added to its diet.

General daily feed required for the average adult 1,000-pound horse in good body condition and health

| | | |
|---------------------------|----------------|--|
| No Work | Hay-20-25 lbs. | Grain-none |
| Light (1-2 hrs./day) | Hay-15-20 lbs. | Grain-1-3 lbs. (1-1.5 lbs grain/hr. of work |
| Medium (2-4 hrs. /day) | Hay-15-20 lbs. | Grain-3-8 lbs. (1.5-2 lbs. grain/hr. of work |
| Heavy (4 or more hrs/day) | Hay-15-20 lbs. | Grain-5-10 lbs. (1.5-2.5 lbs. grain/hr. of work) |

Approximate Amounts (1,000 -pound horse), all hay and grain should be of good quality.

Only a horse that is worked extremely hard would ever receive half of its ration in grain. A racehorse in heavy training is an example of a horse requiring half of its ration in grain. So never feed your pleasure horse more than it needs. Younger horses require special rations, talk to your veterinarian.

There are many books available to show you how to balance a horses' ration or contact your local Penn State Extension Educator for help. When balancing or evaluating a ration, use the National Research Council tables as a guideline to determine available nutrients to meet your horse's requirements. When you balance a ration: Determine the age, weight and level of activity or work of the horse, and determine the actual nutrient content of the available feed by sending your feed to a commercial feed-testing laboratory (follow the direction in the article above). Contact your local Penn State Extension Educator for the name of the laboratory nearest you.

The horse's daily nutrient ration needs will vary due to age, activity or performance level, health status, and, in broodmares, stage of pregnancy or lactation. Estimates of dietary requirements can be found in a variety of publications, such as the [National Research Council's Nutrient Requirements of Horses, 6th Edition \(NRC, 2007\)](#), in extension websites.

- [Feeding Horses by Weight, Not Volume](#)
- [Feeding Horses - Ohio State](#)
- [Feeding Horses - University of Missouri](#)

Once you determine a horse's requirements, then analyze your hay and feeds for what nutrients they provide. This determines if you're feeding program meets or exceeds the horse's needs.

There are a variety of websites that allow you to make the calculations automatically or provide step-by-step instructions. An example of one:

- [National Research Council](#)

Always be careful not to create an excess of other nutrients when increasing feed ingredient levels. Excesses of some nutrients can inter-act with other nutrients. For example, excess calcium can prevent complete utilization of phosphorus. Check [National Research Council tables](#) for calcium to phosphorus ratios; however, a good rule of thumb is a 2:1 ratio.

Metabolic disorders, such as laminitis, osteochondrosis and epiphysitis, stem from an imbalance in nutrients. Many disorders can be avoided by giving your horse a balanced ration. Remember, each horse has to be fed as an individual. Feed an amount that is adequate to maintain a body condition similar to that of an athlete.

The National Research Council requirements are suggested values; individual horses may require adjustments to these nutrients. Constantly assess the body condition of your horse. A properly conditioned horse will have enough fat so its ribs don't show, but you should still be able to feel the ribs when you run your fingers over them. Some horses require more and some less feed than others.

Other factors such as body condition, health history and environmental factors should be taken into account to best design a sound ration for your horse. Consult with your nutrition professional, county extension agent or veterinarian to help you formulate a ration designed to insure the health and longevity of your horse.

Feeding tips

These helpful hints will help you care for your horse nutritionally.

- Provide high quality alfalfa or grass roughage with a complementing grain to balance the horse's diet. Feed by weight, not by volume.
- Always maintain at least half of the ration as roughage, such as hay or grass.
- Never feed moldy or dusty hay, grass or grain.
- Never feed lawn grass clippings.
- Have fresh, clean water available at all times-except to a hot horse. A hot horse needs to be given water slowly.
- Keep feed and water containers clean. Check and clean water buckets and tanks regularly.
- Watch your horse while it eats and inspect feed containers daily to detect abnormal eating or drinking behaviors.
- Check horse's teeth annually for sharp points that interfere with chewing. Floating sharp edges of teeth will increase feed efficacy. If a horse dips mouth in water while eating, it may have a sharp tooth. Tilting head to one side while eating grain may indicate a tooth problem.
- Ration changes should be gradual -- over a minimum of five days to prevent digestive disturbances.
- Proper exercise improves appetite, digestion, muscle tone and mental health for horses.

Because a horse's stomach is very small and cannot hold a large amount of feed at one time, it should be fed at least twice a day on a regular schedule. Some horses benefit from three or more feedings per day. But don't overfeed your horse; too much feed at one time can cause founder.

Estimate your horse's body weight

Multiply the girth (in inches) times itself (heart girth 2) times the body length (in inches) and divide by 330.

- Example: Heart Girth = 74.8 inches Body length = 63 inches $74.8 \times 74.8 \times 63 \div 330$
Equals 1,068 pounds

Reference

National Research Council (NRC). 2007. Nutrient Requirements of Horses, 6th Revised Edition. The National Academies Press, 500 Fifth Street N.W., Washington, D.C. 20001.