

226 Horse Nutrition

Horses require six main classes of nutrients to survive; they include water, fats, carbohydrates, protein, vitamins and minerals.



Water is the MOST IMPORTANT nutrient; horses can't live long without it! Always make sure there is an adequate, clean supply of water. Horses generally drink about 2 quarts of water for every pound of hay they consume. In high temperature, hard work, or for the lactating mare the water requirement may be 3 to 4 times the normal consumption. Signs that your horse may be water deficient include decreased feed intake and physical activity, and signs of dehydration like dry mucous membranes in the mouth, dry feces, and decreased capillary refill time. Possible causes of water deficiencies include no water source, low water palatability, or accessibility (frozen or receiving or contaminated), or illness.



Energy isn't one of the six nutrients because the horse cannot physically consume energy, however, it is a requirement for sustaining life. The most dense source of energy is fat (almost three times more than carbohydrates or proteins); however, carbohydrates in the forms of fermentable fiber or starch are the most common source. Horses exercising, growing, pregnant in late gestation or early lactation need increased energy in their diet. Signs of energy deficiency include weight loss, decreased physical activity, milk

production, and growth rate. However, feeding a diet too high in energy can cause obesity increasing the risk of colic, laminitis, and contribute to increased sweat loss and exercise intolerance.

Fat can be added to a feed to increase the energy density of the diet. Fat has 9 Mcal/kg of energy, which is three-times that of any grain or carbohydrate source. Fat is normally found at 2 to 6% in most premixed feeds; however, some higher fat feeds will contain 10 to 12% fat.

Carbohydrates are the main energy source used in most feeds. The main building block of carbohydrates is glucose. Soluble carbohydrates such as starches and sugars are readily broken down to glucose in the small intestine and absorbed. Insoluble carbohydrates such as fiber (cellulose) bypass enzymatic digestion and must be fermented by microbes in the large intestine to release their energy sources, the volatile fatty acids. Soluble carbohydrates are found in nearly every feed source; corn has the highest amount, then barley and oats. Forages normally have only 6 to 8% starch but under certain conditions can have up to 30%. Sudden ingestion of large amounts of starch or high sugar feeds can cause colic or laminitis.



Protein is used in muscle development during growth or exercise. The main building blocks of protein are amino acids. Soybean meal and alfalfa are good sources of protein that can be easily added to the diet. Second and third cutting alfalfa can be 25 to 30% protein and can greatly impact the total dietary protein. Most adult horses only require 8 to 10% protein in the ration; however, higher protein is important for lactating mares and young growing foals.

Signs of protein deficiency include a rough or coarse hair coat, weight loss, and reduced growth, milk production, and performance. Excess protein can result in increased water

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intake and urination, and increased sweat losses during exercise, which in turn lead to dehydration and electrolyte imbalances.

Vitamins are fat-soluble (vitamin A, D, E, and K), or water-soluble (vitamin C, and B-complex). Horses at maintenance usually have more than adequate amounts of vitamins in their diet if they are receiving fresh green forage and/or premixed rations. Some cases where a horse would need a vitamin supplement include when feeding a high-grain diet, or low-quality hay, if a horse is under stress (traveling, showing, racing, etc.), prolonged strenuous activity, or not eating well (sick, after surgery, etc.).

Most of the vitamins are found in green, leafy forages. Vitamin D is obtained from sunlight, so only horses that are stalled for 24 hours a day need a supplement with vitamin D. Vitamin E is found in fresh green forages, however, the amount decreases with plant maturity and is destroyed during long term storage. Horses that are under heavy exercise or under increased levels of stress also may benefit from vitamin E supplementation. Vitamin K and B-complex are produced by the gut microbes. Vitamin C is found in fresh vegetables and fruits, and produced naturally by the liver. None of these are usually required in a horse's diet. Severely stressed horses, however, may benefit from B-complex and vitamin C supplements during the period of stress.

Minerals are required for maintenance of body structure, fluid balance in cells (electrolytes), nerve conduction, and muscle contraction. Only small amounts of the macro-minerals such as calcium, phosphorus, sodium, potassium, chloride, magnesium, and sulfur are needed daily.

Calcium and phosphorus are needed in a specific ratio ideally 2:1, but never less than 1:1. Alfalfa alone can exceed a Ca:P ratio of 6:1. Sweating depletes sodium, potassium, and chloride from the horse's system, therefore, supplementation with electrolytes may be helpful for horses that sweat a lot. Normally, if adult horses are consuming fresh green pasture and/or a premixed ration, they will receive proper amounts of minerals in their diet, with the exception of sodium chloride (salt), which should always be available. Young horses may need added calcium, phosphorus, copper, and zinc during the first year or two of life.

Forages

Forages are classified as legumes or grasses. The nutrients in the forage vary greatly with maturity of the grasses, fertilisation, management, and environmental conditions. In order to determine the nutrient content in forage it is best to take samples and get them analysed by a forage testing lab (contact your local County Extension Office for testing information or see the fact sheet, FS714, Analysis of Feeds and Forages for Horses).

Legumes are usually higher in protein, calcium, and energy than grasses. They have more leaves than grasses and require optimal growth conditions (warm weather and good soil) to produce the best nutrients. Some legumes include clover and alfalfa. Some commonly used grasses include orchard grass, timothy, bluegrass, and fescue.

Hay is forage that has been harvested, dried, and baled before feeding to horses. Legume hay can contain 2 to 3 times more protein and calcium than grass hay. However, it is usually more costly. Common grass hays include timothy, brome and orchard grass. They have fine stems, seed heads and longer leaves than legumes. They are most nutritious when cut earlier in their growth stage. Maturity at harvest is key to quality. Second cut grass hays average 16 to 20% protein.



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Questions

1. What are the six main classes of nutrients horses need to survive?
 - 1.
 - 2.
 - 3.
 - 4.
 - 5.
 - 6.
2. What is the most important nutrient horses must have?
3. How much water do horses consume ?
4. What are the signs that your horse may be water deficient?
5. What are the signs of energy deficiency in horses?
6. What can fat be added to in order to increase the energy density of a horses diet?
7. What is the main building block of carbohydrates?
8. What can cause colic or laminitis?
9. What are the main building blocks of protein?
10. What are the signs of protein deficiency in horses?
11. Name the fat-soluble vitamins?
12. Name the water soluble vitamins?
13. Where are most vitamins for horses found?
14. What are minerals required for?
15. What minerals might young horses need during the first 2 years?
16. What are forages classed as?