

The Importance of Different Feeds for Different Needs

BY KATHLEEN CRANDELL, PH.D., KENTUCKY EQUINE RESEARCH, INC.

In an ideal world all the horses on a farm, from broodmares to weanlings to horses in heavy work, could be fed the same feed out of the same bag. Unfortunately, the nutritional needs of horses in different life stages vary tremendously, and this makes it difficult to design a "one bag fits all" feed. The basis of any equine diet should be forage. Any concentrate (sweet feed, pellet or grain) should compensate for deficiencies in the forage. One forage may prove to be an acceptable complete diet for a maintenance horse while the same forage may have inadequate levels of protein necessary for a weanling or deficient levels of energy required by a sport horse.

Forage - The Foundation

The horse evolved as a continuous grazer and will graze 14 to 20 hours a day if given the opportunity. The horse has a digestive tract amazingly well adapted to ingesting and digesting forages. Because the basis of any equine diet should be forage, special attention should be paid to the type and quality fed to the horse. Not all forages are created equal. Pasture grasses and legumes as well as hays can vary greatly in protein, energy, vitamin and mineral content depending on the type of forage, the maturity of the plant and where it is grown. When formulating a concentrate to complement a forage, it is often necessary to make completely different mixes for legumes (such as alfalfa and clover) or grasses (such as timothy, orchardgrass and

The horse has a digestive tract amazingly well adapted to ingesting and digesting forages.

coastal). When the forage is a mixture of grass and legume, a concentrate made to be fed with grass forage would be appropriate as long as the mix is less than 50% legume.

Forage choices may be limited in many parts of the country, thus horse owners may be forced to feed forages which may not be ideal. However, once

the forage has been chosen, establishing the type of concentrate should be less challenging. Other factors important when selecting a concentrate apart from the type of forage are age, amount of work and reproductive status of the horse.

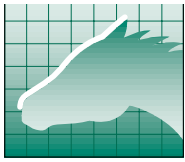


Photo by Robin Stambuck

Feeding the Maintenance Horse

An adult horse that does little or no work is said to be at maintenance. A maintenance horse has very few physical demands placed on it and therefore has very basic nutrient needs. In fact, if a maintenance horse has good quality pasture and a balanced mineral salt designed for horses at its disposition, little else may be needed. If a horse is maintaining weight well on grass and/or hay alone but grain is used to entice the horse to come to the barn every day to be checked, then a feed designed to be fed at one to two pounds per day is ideal. Such low intake feeds as All-Phase Balancer or Fortiphase are excellent products for horses that do not require extra energy to maintain weight, but need a source of nutrients which may be deficient in the forage (such as selenium). When a maintenance horse has a problem keeping weight on, a concentrate may have to be fed in amounts greater

A proper feeding regime is essential for young growing horses.



Kentucky
Equine
Research
INCORPORATED

**UNIQUE
FORMULA**

Endura-Max

Oral Electrolyte For Endurance Horses

ENDURA-MAX is designed specifically to help endurance horses replenish the fluids they lose over the long period of time they compete. Endurance horses need an electrolyte that is designed to provide a longer lasting effect than most other electrolyte supplements can provide.

Unlike other electrolyte formulas, Endura-Max contains increased levels of calcium and magnesium. During long rides calcium and magnesium may be lost in amounts high enough to result in metabolic disorders such as thumps and tying-up. Calcium and magnesium are added to Endura-Max in highly available forms.

Endurance horses have unique electrolyte demands. For all other horses, order Summer Games Electrolyte.

For more information contact:
Kentucky Equine Research, Inc.
3910 Delaney Ferry Road
Versailles, Kentucky 40383
606-873-1988
606-873-1163
<http://www.ker.com>

Distributed by:
**Kentucky Performance
Products, Inc.**

800-772-1988

Valerie Kanavy,
winner of the
World Endurance
Championship in Dubai
knows it works!
"Endura-Max was
instrumental in
helping our horses
handle the desert
heat. They handled
it even better than
we had hoped."



Photo by Tricia Booker,
Chronicle of the Horse

than two pounds per day, but it does not have to be a special, highly fortified or high protein product. Horses survive without the additional nutrients, but for optimal health and well-being, these nutrients should supplement the forage.

Feeding the Broodmare

Proper nutrition is more essential in the broodmare than in any other type of horse because it affects not only the mare but also the foal she produces. Prior to breeding, a mare should be in adequate body condition for maximizing her possibility of conceiving. It has been established that a mare losing weight when being bred is less likely to conceive than a mare gaining weight. Therefore, providing sufficient energy is an integral factor in broodmare feeding management. Furthermore, many nutrients are important to the integrity of the reproductive organs and deficiencies thereof may decrease conception rates.

Once mares have conceived, it is common practice to turn them out into the back pasture and forget them until the last trimester of pregnancy. Granted, the increase in nutrient needs may not be as great in the first two trimesters as the fetus gains only about 35% of its foaling weight, but a well-balanced diet will provide nutrients that can improve the health of the fetus and assure normal development. Ideally, a mare should receive proper nutrition throughout the entire gestation. However, increases in protein, energy, vitamins and minerals may be necessary once the mare reaches the final trimester of pregnancy. Concentrates specially designed for broodmares are the most appropriate because they are formulated with the special needs of the mare in mind.

The average lactating mare produces over 25 pounds of milk per day during the first two months of lactation. If she does not consume enough energy, protein, calcium, phosphorus, and other nutrients from her diet to go into the milk, she will take from her own body stores. Because many lactating mares are rebred, decreases in body weight and nutrient status due to milk production may also affect her ability to conceive. Keeping weight on the mare is easier and more cost effective than trying to help her to regain after detrimental weight loss during lactation.

Feeding the Growing Horse

The young growing horse will achieve 90% of its adult size within the first year of life. With this rapid growth, the body is laying down new tissues that result in bone, tendon, ligament, muscle and other support structures. The foal's diet should supply sufficient nutrients for building body tissues. Mare's milk is nutritionally balanced to meet the needs of the young foal, provided the mare is well nourished. However, by the time the foal is three months old, an increasing portion of its diet will consist of forage and what-

ever concentrate it can snatch from its dam's feed tub. At this time, creep feeding can begin for foals where rapid development is desirable. Creep feeding involves separating the foal from the mare at the time of feeding, feeding the foal its own ration and then returning the foal to the mare when it is finished eating. Creep feeding should be done with a feed especially designed for the young growing foal.

Mare's milk is well fortified with the essential amino acids necessary for growth. Most amino acids (which are the building blocks of proteins) can be synthesized by the body, while others need to be supplied by the diet (limiting). Which amino acids are limiting has been well established in humans and other livestock, but not well defined in the horse. Lysine and threonine are limiting for proper growth in the foal. Once the foal is weaned, it is important that the foal have a quality source of the limiting amino acids in the feed.

Various protein sources found in the diet have different amino acid compositions. Soybean meal is an excellent source of the essential amino acids such as lysine and is therefore commonly used in commercial horse feeds. Quality feeds designed for foals will use soybean meal as a protein source. Foal feeds tend to be higher in protein (16 -18%) than feeds designed for adult horses.

Some forages supply a great deal of protein (with essential amino acids) to the horse, but the amounts are variable.

Which amino acids are limiting has been well established in humans and other livestock, but not well defined in the horse.

For example, alfalfa hay is usually around 18% protein and fresh green pastures often run as high as 26%. The growth spurt observed in yearlings on pasture after the spring grass has started to grow is partly due to the surge in the amount of available protein in their diet. However, grass hays tend to be much lower in protein. For example, the percentages of protein in timothy and coastal bermuda are six and five, respectively. Grass and alfalfa mixed hays are well suited to the young growing horse which has little or no access to fresh forage. For the foal fed grass hay, it is essential that it get additional protein from another source, like a concentrate designed for young growing horses.

While protein may be limiting for proper growth, it is not the only nutritional need of the foal. Sufficient quantities of minerals and vitamins are essential for proper skeletal development and health. Not only are these nutrients needed in sufficient quantities, but also in balance with one another.

Too much of one or not enough of another can interfere with absorption of any number of other nutrients. For example, too much phosphorus in the diet can interfere with absorption of calcium, resulting in hyperparathyroidism (big head disease). Commercial mixes try to take the guesswork out of supplying the appropriate amounts of minerals and vitamins in balanced quantities. When other grains (such as oats) are added to a commercial mix by the horse owner, they interfere with the nutritional balance of the feed.

Feeds especially designed for foals are usually power-packed because the foal has such high nutrient needs, yet cannot consume large amounts of concentrate. A feed designed for the adult horse is usually formulated to supply the essential nutrients at higher intakes. Such feeds would not be appropriate for young growing horses because they would not consume enough of the essential nutrients, just energy.

By the end of its yearling year, a horse will have obtained 90% of its adult weight. The demands for protein, vitamins and minerals still remain higher in the yearling than in the adult horse. While yearlings can eat more than weanlings, they still require a feed which is more concen-

trated than feed intended for adult horses. The dual demands of training and growth make it especially important to pay attention to proper nutrition. During the training process, the bones will undergo constant remodeling to adapt to the stress of work. A balance of vitamins and minerals in the diet will aid in minimizing the amount of stress these changes cause. Further, adequate dietary protein is essential as greater muscle breakdown is a physiological consequence of increased work. Protein for growth and work can usually be supplied with a 14% protein concentrate, or 12% if fed with alfalfa or alfalfa mix hays.

Feeding the Working Horse

Once a horse is in steady work, whether it is light, moderate or intense, special attention should be given to the diet. The demands of performance put stresses on a horse's body that normally would not occur if the horse was turned out in a field. How many horses run and jump over a log just for kicks? The energy requirement increases in grand proportions. The body of the horse is very well adapted to storing and mobilizing energy from various types of nutrients, such as fiber, starch, sugar and fat.

Fiber is often neglected as an energy source. The digestive tract of the horse is designed to obtain energy from forage (fiber). The billions of microbes residing in the cecum and large intestine digest fiber and produce energy in a form the horse can use. The result of microbial fermentation is volatile fatty acids. Once volatile fatty acids enter the bloodstream, they can be used for immediate energy, changed to glucose for energy, or stored in adipose tissue (body fat). This source of energy is not produced very rapidly, and is therefore appropriate for moderate to low intensity work.

Starch and sugars are sources of energy found in large amounts in grain and molasses, respectively. The energy from these sources is converted to glucose in the body, used immediately or stored in the liver or muscle as glycogen (long chains of glucose molecules). This type of stored energy is more readily available and converted more rapidly to energy than volatile fatty acids and fat stores. Starch and sugar are especially important energy sources for intense work like short bursts of speed, but are suitable for any type of work.

Added dietary fat in the form of oil or an animal fat supplement is another source of energy for the horse. The advantage of feeding dietary fat is the concentrated nature of the energy source. Fat can be fed in smaller amounts than grain for the same amount of energy. Further, it appears that horses that have added dietary fat adapt to utilizing fat as an energy source more rapidly than horses with no fat in the diet. The amount of energy available from fat stores is much greater than the stores of glycogen. Therefore, any energy substrate that is stored in such great quantities is



The performance horse depends upon the energy provided by his food.

trated than feed intended for adult horses. Typical yearling feeds have 14 to 16% protein and are fortified similarly to the concentrate designed for broodmares. Balance in the diet, particularly of energy and minerals, is especially important during the yearling year because this is when many of the signs of developmental orthopedic diseases (DOD) such as epiphysitis and osteochondritis dissecans (OCD) begin to appear.

When a young horse begins training, horse owners and

advantageous to utilize. The ability to use adipose for energy is what allows a trail horse to keep going all day. Some energy is coming from fiber digestion, but a great deal is contributed by adipose. The metabolism of fat is relatively slow, so it is not the first energy store a race horse will use, but may be turned on in the final lengths of a race to give the horse some staying power.

Protein can also be used for energy, but it is not the ideal source. If sufficient protein is provided in the diet for turnover of body tissues, the remaining protein can be broken down into a form that is utilized as energy (glucose or fatty acids). The problem with using protein for energy is that during the process of breaking down the protein molecule, nitrogen is left as a by-product. The body will excrete the excess nitrogen in the form of ammonia through urination. Excess protein results in increased water intake, increased urination and increased internal heat production. The first two are not generally a problem as long as the horse has adequate water available, although the ammonia can be overwhelming in a stall. The increase in internal heat production is normally marginal, but may cause a problem in a horse already under heat stress. Generally, excess protein is not necessary for the performance horse and in some cases may be detrimental. Adequate protein is generally provided by a high quality grass or grass/legume mix hay and a 10 to 12% protein grain mix.

The harder the horse works and the more difficult the performance, the more vitamins and minerals the horse is going to need. For example, B vitamins (such as riboflavin, folacin and thiamin) are used during the cycle of energy production and therefore would be used at a higher rate when the horse is working than by the maintenance horse. Contractions cause oxidative damage to muscle cells and vitamin E works as an antioxidant to help restore muscle integrity. The stress of intense exercise on bones during a performance may slightly increase the need for minerals important in bone integrity such as calcium, phosphorus, magnesium, copper and zinc. Unfortunately, hay and grain alone are low in some of the essential vitamins and minerals needed for optimal performance. Concentrates designed especially for the performance horse take this into consideration and manufacturers frequently fortify the product to help the performance of the horse. In essence, you get what you pay for - if the feed is cheap, it is likely not very well fortified because the vitamin and mineral fortification is often the most expensive part of a concentrate.

Feeding the Geriatric Horse

Age takes a toll on the horse's body - parts start to wear out. Everybody can see an older horse get stiffer in the joints as it ages. What horsemen cannot see is what kind of wear and tear is going on in the digestive tract. Lifelong exposure to parasites can leave permanent scarring in the

delicate absorptive tissues of the intestines. Normal degeneration of the digestive tract also occurs with age. The result is a digestive tract that gradually loses its ability to absorb nutrients from feed. Another problem that occurs with age is dental deterioration. If there is a problem with the molars, the horse loses the ability to chew food well. Inadequate mastication of feed will result in large food particles which are not broken down sufficiently for digestive enzymes and microbes to effectively digest the feed, thereby decreasing feed efficiency.

Because of the deterioration of the intestinal mucosa and the subsequent decrease in availability of nutrients, special considerations should be made when planning the diet of the older horse. The ability of the horse to digest protein decreases with age. Production of stomach acid, which aids in protein digestion, decreases, and a related decrease in protein digestibility occurs. An older horse should receive a diet higher in protein so that it has a better chance to absorb an adequate amount. For this reason, senior feeds usually contain approximately 14% protein.

Many older horses maintain weight better when on fresh green pasture. This is because the grass is softer to bite and

The ability of the horse to digest protein decreases with age.

easier to chew than dried forage. Pasture is also more energy-dense than dried forage. Alfalfa in the form of cubes or pellets is also a good fiber source for geriatrics and can be made easier to chew by soaking in water prior to feeding. Because fiber is so very important to the diet of the horse and the horse may not be able to get enough out of conventional fiber sources, alternative fiber types are appropriate. Alternative fibers sources such as beet pulp and soy hulls are highly digestible and easily chewed by horses with dental problems. Due to their high digestibility, they can give a horse as much energy as oats, yet also will keep the microbial population balanced in the cecum since they are fiber. A large portion of the geriatric diet can be replaced with alternative fiber sources.

Because of the deterioration of the digestive tract, feeds designed especially for seniors tend to be more nutrient dense and are manufactured in forms that are readily chewable and easily digestible. Senior feeds are designed with a high fiber content to increase a portion of the dietary fiber. As such, they are designed to be fed at higher intakes. In some extreme cases of tooth loss, senior concentrates can be fed exclusively.

The nutritional needs of a horse differ significantly throughout the stages of life. The "one concentrate for the whole farm" idea is becoming obsolete as horsemen increase their understanding of feeding horses for optimum performance and health. ☺☺