



Fact sheet

Performance Horse Nutrition and Notes on Conditioning

S. L. Ralston, VMD, Ph.D, Diplomate ACVN, Extension Specialist in Equine Science

I. Introduction

Diets which maintain optimal body condition and performance are as varied as the type of competition expected of horses. There are however several areas that are common to all types of performance. All horses need water, energy, fiber, protein, and at least minimum levels of vitamins and minerals to maintain desired condition for performance.

The following is a summary of basic nutritional concerns in relation to the special needs of performance horses.

II. Nutrients

Energy Sources

Hard-working horses (training more than 5 days a week for an hour or more) need more energy than the average horse worked lightly on weekends only. Energy may be provided by carbohydrate, fat, protein and/or fiber in the diet. Carbohydrates and fats are the most concentrated and efficient sources of calories for horses, fiber is the most “natural” source. These energy sources are broken into component parts by digestive processes, absorbed and either used directly for energy production or stored as fat.

Carbohydrates are abundant in grains, fresh green grasses and legume (alfalfa or clover) hay. Grass hay contains variable levels of available carbohydrates, depending on its quality. Low quality hay has higher fiber and lower carbohydrate and protein than high quality hay. Quality is affected by the maturity of the hay at harvest (older = lower quality), presence of undesirable weeds or mold.

Grains and hays normally contain only 2 to 5% fat. Oils (grain or vegetable sources) contain twice the amount of energy as an equal amount of sugar or protein. While vegetable oils are readily digested and utilized by horses, it is not recommended that a horse's diet contain more than 10% fat.

Fiber is found predominantly in roughage (grasses and hays). It must be fermented by bacteria and protozoa in the large intestine to produce usable energy sources (volatile fatty acids). The digestion of fiber may provide up to 50% of the available energy if a horse is fed only grass and/or hay. It is not as efficient a source of energy as carbohydrates or oils, providing only 2.5 Cal of energy/gm of fiber versus 4 Cal/gm of glucose or 9 Cal/gm of fat. It is, however, the primary source of energy to which the horse was adapted over evolutionary time and provides a “cool” (minimum heat generated on the muscles) type of energy. A horse's diet should consist of at least 50% of a good source of fiber by weight. All grains are deficient in fiber.

Protein is used as an energy source only if carbohydrates, fats and fiber are deficient or if there is excess protein in the diet. The utilization of protein for energy releases more heat, than an equal amount of sugar, fat or volatile fatty acids. It also generates ammonia which must then be excreted as urea in the urine. This may cause a relative increase in sweating and urinary water losses, contributing to dehydration and increased risk of tying up.

The absolute need for protein is slightly increased in the hard-working horse. However, the percent of protein in the diet need not be above maintenance (8-12%). The horse will be eating more to meet their energy needs, thereby taking in more

protein. Feeds which are high (above 14%) in protein include alfalfa or clover, soybean meal, brewers' grains and milk by-products. If a mature performance horse is fed alfalfa or clover hay, it will not need a protein supplement.

Electrolytes and Water

The important electrolytes are potassium, sodium, chloride and calcium. If the horse sweats for a prolonged period of time during training or competition, it will need to drink more water and electrolytes than normal to replace its losses. Grasses and legumes (alfalfa, clover) are high in potassium. Legumes are also high in calcium. Most grains are deficient in all of the major electrolytes. Both hays and grains have low levels of sodium (<.05%) which is why all horses require free access to plain salt. Performance horses in particular should have free access to salt. Additional electrolytes (Table 1) are not usually necessary except after prolonged sweating (> 1 hr) during training or competition.

Water requirements will not be adequately met by any of the horse feeds. A source of clean, ice-free water is essential for optimal performance. A horse fed only dry hay and grain will need more water than a horse on lush pasture. Water consumption may increase to as high as 15 to 20 gallons per day in hard working horses. The only time water intake should be restricted is if the animal is very hot, the water very cold and/or the horse is not going to continue to work after drinking. Under these circumstances the horse should be offered 1/2 to 1 gallon of water every 15 to 30 min until no longer thirsty or completely cooled.

Under conditions of prolonged sweating, such as during a marathon or 2 to 3 hrs of intense training, significant amounts of water and electrolytes will be lost. If not replaced by allowing the horse to drink, graze and/or consume an electrolyte supplement every 2 to 3 hours, severe losses may result. Electrolytes should not be force fed, however, if the horse is dehydrated. The key is to offer small amounts of electrolytes frequently during prolonged (> 3 hr) exercise and to make sure the horse is drinking sufficient water to maintain hydration.

Vitamins and Minerals

Stress and high energy expenditure increase the

levels of B vitamin and possibly vitamin C and E required in an athlete's diet. The requirements for vitamin A and D however, are not altered by strenuous exercise. High levels of these last two vitamins (> 10 times in excess of need) may be detrimental and should be avoided.

Fresh grass, alfalfa and grass hays contain moderate to high levels of vitamins A, D, E and B-complex. Brewers grains and brewers yeast are fairly good sources of B-vitamins. There are a multitude of vitamin-mineral supplements on the market. Please read the labels carefully! Many contain near toxic levels of vitamin A (>75,000 IU/dose) and D (>7,500 IU/dose). Trace mineral needs such as copper, iron, zinc or iodine are not known to be increased by exercise. Excessive supplementation of these may interfere with absorption and metabolism of other minerals and is not recommended unless a true dietary deficit is known to exist.

Summary

Any animal under stress will have an increased need for B vitamins. All animals that are worked hard will need more available energy but not necessarily more protein in their diets. The need for water and electrolytes are increased in any animal that is worked for prolonged periods of time and sweats profusely. Protein needs will be adequately met by a balanced diet of hay and grain. Supplements should not be necessary unless poor quality hay or forage is fed (Table 3). Body condition and performance are the best determinants of adequacy of diet. Proper diet will only permit a horse to reach its genetic potential for performance within the limits of its training. Nutritional supplements will not compensate for poor conformation, lack of natural ability or improper training.

The condition of the performance horse is in the "eye of the owner". You must monitor the horse's condition closely and adjust its rations either up or down to allow for its individuality. Avoid over supplementation of vitamins and minerals and never feed more grain than hay to horses which do not have access to good pasture.

Conditioning

The easiest and best way to monitor your horses' fitness is by heart rate recovery after exercise. "On

board” monitors are nice but not essential. If the horse was worked within it’s capabilities, heart rate should return to <60 to 64 beats per minute within 15 minutes after a workout. If recovery is slower, you have stressed the horse but within acceptable limits if the criterion pulse is achieved within 30 minutes. If it takes longer than 30 minutes to recover, you have over stressed the horse and should monitor it closely until it does recover. Assuming no ill effects, the next workout should be less strenuous! Use the recovery rates to gauge whether the horse could do more.

It is essential to train in terrain similar to that when you expect to compete. Horses trained exclusively in flat, sandy areas will not be able to handle hills, or hard packed surfaces.

Increase your horse’s energy intake only in relation to work done, not anticipated to be done! There is a “golden period” 1 to 12 hr after strenuous work during which energy storage and muscle conditioning is optimized. After the horse has cooled off, feed small (1 lb grain) amounts of grain hours for up to 8 hr to horses competing heavily and losing weight or condition.

Table 1 “Home made” electrolyte mix

1 pound box table salt (NaCl)
12 ounce box “Lite” salt (NaCl/KCl mixture)
2 to 3 tablespoons bone meal or calcium carbonate source

Mix thoroughly and feed 1 to 2 ounces (3 to 4 tablespoons) per hour of strenuous work. Do not feed free choice or give on days when horse is not worked.

Table 2 Sample Diet - amounts fed per day
Show or Distance/Endurance Competition

0 to 10 lb grain or pelleted feed¹ divided into two or three feeding
20 to 25 lb hay (preferably grass or grass-legume mix) or free access to good quality pasture
2 ounces trace mineral salt in grain
Free access to plain salt (white)² and water
Electrolytes: see Table 1

¹ Can use plain grain such as oats, corn, barley or a commercial mixture. Protein levels above 12% are usually not necessary unless hay quality is very poor.

² Either blocks or loose salt can be used. If horse is biting the salt block, loose salt would be better.

Table 3 Supplements for Performance Horses¹

A. Nutrients usually not needed in supplements if horse is on good quality hay or pasture and commercial grain mix, but often included in commercial supplements. Amounts listed are considered to be “safe” even if not needed.

	“Safe” Concentration in 2 oz dose	“Safe” amount per daily dose of supplement
sodium	8 to 10%	10 to 12 gm
copper	.09%	70 mg
zinc	.30%	300 mg
iron	.30%	300 mg
manganese	.30%	300 mg
selenium	.001%	1 mg
vitamin A ²	25,000 IU	25,000 IU to 50,000 IU
vitamin D ²	2,000 IU	2,500 IU to 50,000 IU
vitamin K ²	<u>not needed</u>	<u>not needed</u>

B. Increased amounts needed

	Sources	Amount
Energy	grains, vegetable oil	as needed to maintain body weight up to 2 cups per day
Electrolytes	salt, electrolyte mix (see Table 2)	1 to 2 ounces per hour strenuous work
B-vitamins	fresh grass, alfalfa, brewers yeast various commercial supplements	free choice 60 to 90 gm/day feed according to label
vitamin E	grass, alfalfa various commercial supplements ³	free choice up to 1,000 IU/day

¹ Assumes a mature 500 kg (1100 lbs) horse

² Toxic at 10 X recommended dose

³ Beware commercial combinations with Selenium - to get 1000 IU vitamin E would often require that potentially toxic amounts of Selenium would also be fed.

Author recognizes the assistance of Mr. James Kenney in preparation of this table.