

Feeding High-Performance Horses

by: Sharon Biggs

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Sometimes the difference between winning and losing is only a fraction of a second. High-performance equine trainers are well aware of this little margin, and as a result, they are always trying to find that one thing that will help their horses increase their speed. But this is not always an easy endeavor.

Brian Nielsen, PhD, PAS, Dipl. ACAN, professor and researcher in equine exercise physiology and nutrition at Michigan State University, says that you can never improve on an animal's genetic potential, but you can hope to maximize it. One way to do that is with nutrition.

"It's important to have enough calories in the fast athlete because it gives him that cutting edge," he says.

"You're typically not going to lose a race because the protein wasn't exactly right or the vitamins or minerals weren't exactly right, but calories can really impact the result because they fine-tune a performance. Inadequate energy intake can quickly result in an animal that fatigues prematurely and fails to perform at its top potential."

Gary D. Potter, PhD, PAS, Dipl. ACAN, a professor in the Equine Sciences Department at Texas A&M University, adds, "The component of the nutritional requirements that increases the most due to speed is certainly energy, also known as calories. And, importantly, in speed and racehorses, those extra calories must come principally from carbohydrates, so that anaerobic energy production is facilitated."

Nielsen adds that other nutritional needs, such as protein and minerals, are not usually such a factor as they are easily met. "On a concentration basis, the mature performance horse may need 10% of protein," he says. "The standard feed ration is typically much above that because protein comes from both hay and grain--both of which often contain more than that."

Commercially prepared concentrates already have vitamins and minerals added to them, and rarely are a horse's mineral or vitamin needs neglected. However, it's a tricky business to meet the energy requirements of the high-octane horse within a safe manner. "A horse that's working hard does have a high energy

requirement," says Nielsen. "And when we are trying to get that into a horse, we have to feed him a fair bit of concentrate, meaning grain, of course. In this case, we run the risk of health problems such as founder and colic. Horses can also develop behavior problems because they will eat grain in really quick fashion and then have a lot of time left with nothing to do."

Challenges of Feeding More

The time the food spends inside the stomach and small intestine combined (called the retention time) is relatively short in the horse, within two or three hours. After that, the feed moves into the hindgut (which includes the large intestine and rectum). Soluble carbohydrates--things like starch--should be broken down and absorbed before they reach the hindgut. When too many concentrates are taken in during a single meal, some of that starch will reach the hindgut. Starch causes the microbes in the hindgut to change. Lactic acid microbes proliferate, which causes the pH to drop in the hindgut; good microbes die and endotoxins are released. This phenomenon can cause laminitis.

Lack of saliva can cause impaction, and saliva is released during chewing. "Since one pound of pellets takes less time to eat than one pound of hay, a horse can eat a lot of grain in a hurry and saliva is not developed, so an impaction can develop," notes Nielsen.

He says there are guidelines that can be used to prevent these issues. One is to feed no more than 0.75% of the horse's body weight as grain per feeding (a 1,000-pound horse would receive 7.5 pounds of grain). Some might prefer a safer guideline, which is 0.5% of their body weight (a 1,000-pound horse would get 5 pounds).

"With the larger guideline, you are unlikely to colic or founder a horse, but you still begin to see some changes in the microflora of the hindgut, but it won't be life-threatening or particularly harmful," he says. "With the smaller amount, there will be very little change in the microbe content. If a horse does need a higher grain diet, feed little and often; in other words, divide the meals up into several throughout the day if you have the ability to do so."

Cereal Myths

Oats remain a popular grain to feed the top athlete, but Potter warns that, "Oats, like other single grains, do not

provide all the nutrients the horses need--it is not a nutritionally balanced feed. Athletic horses need much more than is provided by oats."

Nielsen adds that oats and other cereals, when fed on their own as opposed to in a prepared concentrate, usually have an inverted calcium/phosphorus ratio. "Most straight grains have more phosphorus than calcium," he says. "If your total diet has more phosphorus than calcium, horses can develop a disorder called nutritional secondary hyperparathyroidism, more commonly known as 'big head' disease or 'bran' disease."

This condition causes the body to mistakenly perceive a deficiency of calcium, even if the body is receiving enough. In order to maintain calcium plasma concentration, parathyroid hormone is released, and the body begins to resorb mineral from the bone. As a result, the bone that is left is not nearly as strong.

"It's called big head disease because you see it first in the facial bones," says Nielsen. "It's enlargement of the bones, but it is not a good thing because the bone will be more porous. If you're feeding a commercially prepared concentrate, the odds are slim that this will occur. Also, most hays have more calcium than phosphorus and most feed companies add calcium to the ration as a safeguard. If you're feeding a lot of oats or other raw grains with inferior hay, a horse can develop the problem."

Feeding Fat for Energy

Carbohydrates have always been the way to get that extra energy. However, a horse can get energy out of both carbohydrates and lipids (fats). In fact, fat--which can provide stored, slow-release energy--has an advantage over grain because it is very safe to feed.

"Fat is a very concentrated source of energy," says Potter, "and you can increase the energy supply with the smallest amount of feed by feeding supplemental fat. Anytime you can minimize feed intake at one meal, it reduces the chance of overwhelming the digestive capacity of the stomach and small intestine. That is what makes fat safe."

Studies have shown that fat can be as high as 20% of the diet without harmful effects on the animal. There have been many benefits shown for athletic performance when a horse is receiving up to 10% fat in the diet. But most people feed well below this percentage, largely due to expense.

"Let's say your 1,000-pound exercising horse eats 2.5% of his body weight (per day), so that's 25 pounds," says Nielsen. "So 10% of 25 pounds is 2.5 pounds of fat per day. To put that in perspective, if people are feeding corn oil, that means about five cups of corn oil a day, which is expensive. Many people can only justify this for an elite athlete that has a large earning potential."

Fats include corn oil, vegetable oil, and rice bran. There are also prepared products available that have fat that is either sprayed onto a pellet or incorporated into a pellet. "I like soybean oil because it contains specific omega-3 fatty acids that help minimize the inflammatory process during exercise," says Potter.

How Fat Works

Fat is used slowly, and for an endurance horse, this is an advantage because an endurance horse has a big energy demand. Another benefit to this equine athlete is that fat is oxidized when a horse performs aerobically (his muscles use oxygen in their energy-generating process). In other words, oxygen must come into play in order for fat to be released as an energy source.

Animals that are required to run fast in a short period of time, such as the barrel horse, cutting horse, racing Quarter Horse, or jumper, perform anaerobically. This means the horse works hard for a short period and breathes heavily after the work--essentially, the energy exchange in his tissue occurs independent of oxygen. These horses can't use fat for their activity because there is not enough oxygen available to allow utilization of the fat.

However, there is a phenomenon called the glycogen-sparing effect. Glycogen is a readily available carbohydrate source stored in the muscles and liver that can be converted to glucose to meet energy demands in the horse that's working anaerobically.

"On your normal day-to-day exercise with these horses, they will not be performing anaerobically," says Nielsen. "Typically you won't sprint the horse in your daily activity; he's probably going to be working aerobically, so it's believed he will use the fat and won't tap into the glycogen reserves. For the everyday activities, fat from the diet is used and the glycogen stores will be left. When you go to compete, you should have more glycogen available, which should allow the horse to go longer until it fatigues. When you watch a race and the winning

horse seems to pour on more energy, he probably isn't going that much faster--everyone else is fatiguing and slowing down. If you can keep that glycogen, there is less chance the horse will fatigue before the finish."

Doctor Recommendations

Keep it simple! This is not what many people would expect to hear, but Nielsen is of the opinion that people end up creating more problems by complicating their horse's nutritional needs. Nielsen says most people neglect to consider forage when thinking of nutritional needs, and that forage should be the first step when designing a program for any horse.

"I'm flexible on what that hay is, because hay content differs according to what part of the country the hay is grown," says Nielsen. "The only time you feed concentrate is to make up the deficiencies that exist from your hay and to give extra calories. In other words, if you can feed enough hay, you don't need to feed any concentrates. Hay is a major contributor in nutrition."

However, most people don't know what their hay is actually providing. The best way to find out is to have a hay sample analyzed by your local extension service. Then you can see if there is a problem with minerals and see how much energy and protein is being provided.

However, Potter says that elite athletic horses cannot compete well on a high-fiber diet alone and will need extra nutrition. "Control the ratio of hay and concentrate feed such that the daily ration is about 40% hay and 60% concentrate," he says.

Both Potter and Nielsen recommend sticking with a commercial concentrate because it is blended by a knowledgeable nutritionist and, therefore, nutritionally balanced. Both veterinarians also agree that the elite horse should be on an added-fat diet. Potter suggests 18-20% of the total calories should be from fat, which translates into about 10% of the weight of the concentrate feed. There are high-fat concentrates (industry standard around 6% fat) manufactured for that purpose on the market, but one needs to remember that the percentage in the total ration will be lower because hay will be included.

"Considering hay isn't going to be providing much fat, the total diet would be just a little over 3% fat," says Nielsen. "That's far off your 10% goal to maximize benefits. In this case top-dressing with a fat will help bring

the percentages up, although one needs to be concerned about diluting out your other nutrients. This is particularly true when feeding young, growing horses."

Take-Home Message

You and your veterinarian and/or a veterinary nutritionist can design your high-performance horse's diet so that he will have the nutrient levels that his job demands.

THE RIGHT TRACK

The racetrack or competition arena is no place to test your feed program. A recommended portion of calories isn't a helpful guide, as all horses burn calories differently. The only way to tell if you're meeting your energy requirements is by evaluating the horse's body condition score (BCS).

"With energy or calories, you can look at your horse and see if you're meeting his needs. I like my performance horses right around a 5," says Brian Nielsen, PhD, PAS, Dipl. ACAN, professor and researcher in equine exercise physiology and nutrition at Michigan State University. "If you're below a 5, then you have a deficiency in glycogen reserves and that horse will not do well. If you are much above a 5, then a horse will move slower with that extra weight. Extra weight will also cause a horse to heat up and put more weight on the legs, increasing the likelihood of injury."

With a BCS of 5, you typically won't be able to see the ribs, but you can easily feel them. If you can see the ribs, you probably need more calories, if you can't feel the ribs, he's carrying too much weight.

For more information on BCS, visit www.TheHorse.com/ViewArticle.aspx?id=7205. --Sharon Biggs

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