Managing the nervous racehorse

Smart feeding practices can help a racehorse overcome physical and mental stress

by Amy Gill, Ph.D.

THE THOROUGHBRED is bred to be a finely tuned animal with tremendous speed and stamina. But years of selective breeding have produced certain negative physical and psychological traits in the breed.

These traits, in combination with the intensive management and unnatural environment required to maintain a horse in training, can lead to a reduction in performance from disorders related to metabolism of carbohydrates, muscle and respiratory disorders, digestive upset, skeletal unsoundness, and aberrant behavior. Many racehorses exhibit stereotypic behaviors such as stall walking and weaving and vices such as cribbing and wood chewing as a means to relieve stress. Because physical and psychological disorders can affect a racehorse's performance, devising ways to minimize stress in the animal's daily management becomes paramount.

A large part of the problem can be attributed to the racehorse's diet and feeding regime. Kept in a confined area or stall, a racehorse lives in an environment far removed from nature. Instead of grazing 16 to 18 hours a day, a racehorse may spend as little as one to two hours a day engaged in feeding. A racehorse generally receives only two or three concentrated meals a day and often quickly devours these meals, leaving many hours of idle time that can lead to behavioral problems.

As a grazing herbivore that survives as part of a large, social herd, the free-ranging horse rarely develops metabolic or behavioral disorders. But a racehorse has lost the ability to expend physical energy from constantly walking while grazing. A racehorse does not eat large quantities of fibrous, low-energy feeds and does not engage in normal socialization. Because of the extreme nutritional requirements of training and racing, a racehorse must be fed high-energy, nutrient-dense feeds that appear to contribute to some of the previously mentioned health issues.

A racehorse's intake of fibrous foods and forages is greatly reduced. To compound the problem, a racehorse at times will back off its feed, which presents a trainer with a larger challenge to keep the individual in peak condition. Fortunately, science and technology have provided resources to improve feeding and managing a racehorse that help minimize physiological and behavioral problems.

Feeding management

Managing a racehorse's feeding is both art and science and when done properly provides the horse with a balance of energy and other required nutrients to perform at a maximum level. Horses training at maximal exercise levels expend great amounts of energy and sometimes have trouble consuming enough feed to meet energy, or calorie, demands.

One of the most daunting tasks for a trainer is to keep racehorses at their optimum weight. Most racehorses are fed large quantities of grain (which contains approximately 45% to 65% soluble carbohydrate, or starch) in their rations because grains are traditionally more energy dense than forages that contain structural carbohydrates, or fiber. Because the horse is an herbivore designed to graze forages on a continuous basis, feeding large amounts of grain—which is not a natural feedstuff for horses—can lead to starch overload in the hindgut and can result in such metabolic disorders as colic, laminitis, insulin resistance, and Cushing's disease.

Nonetheless, grains are palatable and high in digestible energy and, if managed correctly, should be incorporated in reasonable amounts in the racehorse's diet, as glycogen repletion and storage following maximal exertion are somewhat dependent on glucose provided in the diet. However, other ingredients such as vegetable oils and soluble fibers—most notably beet pulp, soybean hulls, and rice bran—do not contain high levels of starch and can be blended into the ration to help increase its digestible energy content without increasing the risk of starch overload. Fats and fibers do not cause an increase in blood glucose when consumed, a biochemical reaction that in some horses seems to intensify the sugar high associated with feeding high-grain diets.

Grain and gut acidity

Large amounts of grain feeding is also associated with increased gut acidity. Higher frequency of stereotypic behavior is observed when horses are fed high- grain diets (typically a 2:1 grain/forage diet) as compared to an all-forage diet.

In one study, horses on high-grain diets showed decreased incidence of aberrant behavior when a hindgut buffer, which neutralizes some acid in the cecum and colon, was added to the diet. Some researchers believe that high-grain diets cause low-level pain due to acidity in the gut, which serves as a stimulus for stereotypic behavior.

Many foals that begin cribbing at an early age do so when grain is added to their diets, normally around the time they are weaned. It has been speculated that cribbing actually increases the flow of saliva, which acts as a buffer for acid produced in the stomach and helps to control gastrointestinal discomfort. Many horses with a propensity to tie up also will benefit from the addition of fat to the diet because fat helps to lower the starch content of the diet, which may decrease excitability and nervousness.

Effects of starch

Whether fat's calming effect is actually due to its chemical makeup and/or how it is metabolized remains unclear. Certain horses are more reactive to high levels of starch in the diet, which can influence their behavior. Behavior modification for these individuals may be as simple as adding other nonstarch ingredients to the diet.

Eating a grain meal is directly linked to an increase in serotonin, a brain neurotransmitter that modulates mood activity and alertness. High levels of serotonin observed after eating meals high in starch have been implicated as the reason for "sugar highs" in hyperactive children, and it is reasonable to assume that a similar response would be seen in some horses following a grain meal high in starch.

Other factors such as sex, genetics, breed, and environment can affect behavior in horses, but it is fairly safe to say that reducing starch in the diet of racehorses appears to play a role in improving their mental health.

Feed excitability

Many horse owners also believe that such grains as oats and corn cause a horse to have too much energy or become "hot"—more excitable and difficult to handle. Molasses also could contribute to excitability because of its high sugar content, which can affect certain horses that are sensitive to sudden increases in blood glucose following a meal of sweet feed.

This issue can be confusing, because the term "energy" should be used to describe caloric density of a ration, and the terms "hot" or "hyper" should refer to the mental or behavior status of the horse. The mix-up occurs because excess feeding of energy, or calories, will invariably result in a horse that is hot or hyper, and the source of energy might not be the important factor.

In general, the racehorse that is fed high-energy feeds and then kept in confinement is almost guaranteed to become less tractable and more nervous than a horse that has access to pasture. One possible solution to this problem is to use concentrates that are in pelleted or extruded forms, with ingredients ground, mixed together, heated, and formed into small nuggets. Heating alters the starch molecule, and makes it more digestible and easier for the horse to absorb. The nice thing about pelleted or extruded products is that little or no molasses has to be added to the mix, and the shelf life of the product is longer due to processing.

Simulating nature

Since the basis of all diets for horses is forage, racehorses should always have ample amounts of the best quality hay available at all times other than when feed must be reduced or withheld prior to a race on race day.

The horse has evolved over millions of years as a grazer, with a digestive tract equipped to digest and use high levels of plant fiber. The horse's cecum and colon, collectively known as the hindgut, house billions of microbes and protozoa, which produce enzymes that break down or ferment plant fiber. These microbes are essential to the horse, which does not produce these enzymes. Byproducts of microbial fermentation of forage provide the horse with a source of energy and micronutrients.

A good forage choice for racehorses is a grass and legume mixed hay. Quality of hay is determined by the stage of maturity when cut, growing conditions, amount of fertilization of the field in which it is grown, and how it is prepared and stored after being cut. Which cutting the hay is from is usually irrelevant as any cutting can turn out good or bad depending on these factors.

Small feedings

Concentrate feeding should be broken up into as many small feedings as possible, as research has shown the capacity to overload the hindgut with grain occurs when the horse is fed more than 0.4% of its body weight at any one feeding. For a 1,000-pound animal, this translates to no more than four to five pounds of grain mix per feeding.

According to the National Research Council, horses in heavy training may require as much as 3% of their body weight per day in dry matter (feed and forage), with proportions of 65% concentrate and 35% as forage. Therefore, the 1,000-pound horse may require 30 pounds of total feed with perhaps 19.5 pounds of concentrate and only 10.5 pounds of hay.

If we abide by the rule of no more than four to five pounds of concentrated fed at one time, horses consuming this amount of concentrated feed should be fed a minimum of four times daily. Increasing the feeding frequency of concentrated feed may also encourage the finicky eater to nibble hay more often and actually consume more hay. A study at the University of Kentucky showed that horses fed eight meals of concentrated feed per day spent more time eating hay than horses fed only two times per day. These horses also tended to eat more hay, which could be useful when trying to maintain or encourage weight gain.

Caloric intake

The ingredients fed a racehorse also can make a difference in how many calories the athlete receives.

Oats: One of the most popular feeding ingredients is oats, which are palatable to horses and fairly safe to feed due to the fiber content of the hull and the relatively easy digestion of oat starch.

Unfortunately, oats contain the lowest amount of calories of all the grains fed to horses, and if a horse is having trouble keeping weight on, a straight oat and hay diet will do little to improve the situation. Commercial concentrated mixes are usually composed of a variety of grains, fats, and the increasingly popular soluble fibers, which contain a higher digestible energy content than long-stemmed forages.

Also, most performance level feeds are highly fortified with amino acids, vitamins, minerals, probiotics, yeast, and other nutrients that straight oats lack. It is also important not to cut oats into a commercially prepared mix as doing this unbalances the nutrient content and ratios of the feed.

Beet pulp: A soluble fiber derived from the processing of sugar beets, beet pulp has become a popular feed ingredient for racehorses in the past decade. Because it is a fiber, it is fermented like hay into volatile fatty acids by microbes in the hindgut but, when digested, beet pulp yields energy levels similar to that of oats.

Rice bran: Rice bran, a byproduct of rice milling, is another soluble fiber that is gaining in popularity. Rice bran is digested in the hindgut in the same manner as hay but yields a higher energy content. It also contains an anabolic plant sterol called gamma oryzanol, which is thought to increase lean muscle mass.

Benefits of oil

Adding vegetable oil to the ration is a great way to increase caloric density without asking the horse to digest and metabolize additional starch. Oils contain more than twice the calories of grains, contain no starch, and are easily absorbed from the small intestine. Therefore, when a horse eats high-fat products, the animal needs to consume less feed to achieve the same caloric density of a feed containing high amounts of starch.

Because of this huge benefit in feeding horses that need to eat large quantities of feed, many commercial concentrated feeds now commonly contain added oil in the amounts of 5% to 10%, and fats or oils can comprise as much as 20% of the total diet of the racehorse, if necessary.

Besides increasing calories in the diet, high-fat diets have been shown to improve performance in high-intensity, short-duration activities such as racing. These individuals will use fat as an energy substrate preferentially over glycogen for a longer period of time during racing, which allows for a reserve of glucose when it is needed toward the end of the race.

Due to biochemical differences, fat-adapted horses carry a lower thermal load and produce less carbon dioxide than horses using glycogen as an energy source, which results in a much more efficient, economical way of producing adenosine triphosphate (ATP) for muscle contraction. From a behavioral standpoint, fat- or oil-supplemented diets have been reputed to modify behavior in excitable horses. One study has shown that horses fed a diet supplement containing corn oil showed less spontaneous activity and reactivity when subjected to pressure, loud noise, and sudden visual stimuli.

Another interesting aspect of fat digestion and absorption is the role of lecithin, a substance naturally produced by the liver. Lecithin is a fat emulsifier that breaks down the fat molecule into smaller particles, which are readily absorbed across the cell membrane. Lecithin also has been shown to increase production of acetylcholine, a neurotransmitter in the brain that helps to diminish startling and reactivity. Synthetic lecithin may be added to high-fat concentrates to increase absorption of fat in the small intestine.

Mix of benefits

Feed companies are incorporating grains, fats, and soluble fibers into their performance horse feeds to provide safe, easily digested energy-dense rations for horses requiring large amounts of feed to maintain their weight. When considering a concentrate mix for hard keepers, bear in mind that several ingredients blended together usually provide the most energy and the proper amounts and proportions of other necessary nutrients. A custom blend or a commercial mix is recommended over home mixes because it is easy to unbalance the ration if too little or too much of one or several ingredients are added.

The goals for feeding and managing racehorses should include the use of high-quality forage, concentrates that contain high fat and soluble fiber, and the implementation of a routine program that minimizes digestive, metabolic, and emotional disorders. Even when the best feeds are used, horses that are unhappy in their environment will not be able to perform to the best of their ability because stress and discomfort will whittle away even at the greatest genetic potential.

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Vitamins and minerals might have calming effect on nervous horses

NOTHING works better in calming nervous horses than managing diet and exercise to correctly match the individual needs of each horse. However, many supplements are marketed as having a calming effect on high-strung horses.

The most common supplement for nervous horses is thiamin, a B vitamin. B vitamins are produced by the microbial populations in the hindgut, but horses in heavy training that are stressed might not produce adequate amounts to meet their requirements. Thiamin is known to induce problems with brain function when deficient; adding some to the racehorse diet could decrease anxiety and excitability in nervous horses.

Thiamin supplementation is safe because the vitamin is not stored in the body. It might even help to improve appetite in picky eaters, though none of these anecdotal reports has been proven in clinically controlled studies.

Magnesium supplementation also has been noted to improve mental capacity in horses (one to two ounces of magnesium oxide per day). Severe magnesium deficiency is rare in horses, but symptoms include muscle tremors, poor work capacity, insulin-resistance excitability, and convulsions. Generally, the common diet of the racehorse provides more than adequate amounts of magnesium, but certain individuals may respond positively to supplementation.

Excess magnesium can interfere with calcium metabolism and absorption, and it is important the ratio of calcium to magnesium remains at 2.5:1. Total calcium requirement for horses is 20 to 40 grams per day depending on level of work being performed, and magnesium requirement is 6.75 to 13.70 grams per day.

Protein percentages

In the horse's body, dietary protein serves as a source of amino acids, which can be used to make other proteins. Protein is not intended to be used as a source of energy in the ration because it is difficult for the horse to degrade, as opposed to starches, fats, and soluble and structural fibers that are readily available as substrate for energy production. But under certain conditions such as starvation or very intensive exercise, amino acids called branched chain amino acids can be oxidized as fuels by muscle, adipose, kidney, and brain tissue.

Horse feeds have traditionally been marketed as 12%, 14%, or 16% protein, which can confuse the buyer because these percentages indicate the amount of protein or nitrogen available from the diet that can be broken down into amino acids and used by the horse to make other proteins.

The percentage of protein has little to do with the actual calorie content of the feed; generally, the higher the percentage of protein, the more energy dense the feed is because higher protein feeds are formulated specifically for horses that are engaged in intense work. Therefore, the use of high-protein, high-energy feeds can lead to increased nervous activity in a horse if the amount of exercise and energy expenditure do not coincide with the amount of energy consumed.

Additionally, some studies in humans and dogs have shown that the amino acid profile in the diet can be manipulated to reduce behaviors such as aggression and hyperactivity. Therefore, the source of protein and the specific amino acids it supplies could be more important than the absolute total amount of protein in the diet.—*Amy Gill, Ph.D.*