

## Comparison of Grain Based Feed to Fiber Based Feed

Dr. Amy M. Gill

The science of equine nutrition has changed dramatically in the last 20 years as nutritionists have recognized the importance of feeding the horse a diet lower in refined sugars and starches. Gone are the days of the old cliché "feed hay, oats and water" as we now know this is not a balanced diet for the modern horse. Feeding less sugar and more fiber is much more natural for a horse, whose digestive tract and physiology is particularly inefficient at digesting, metabolizing and absorbing high levels of glucose, the end product of starch and sugar digestion. Some of the most profound improvements include the use feed rations containing higher fat and fiber fractions and the manufacturing of various combinations of feed ingredients that are then processed in various ways to stabilize and enhance the nutritional value of the product. Processed feeds, such as those that are cubed, pelleted, steamed, flaked, cracked, extruded (heated under pressure) or micronized (infra red waves heat and vibrate the starch molecule, restructuring or gelatinizing it), are a good choice for all horses because they are more easily digested and absorbed in the digestive tract. In addition, the starch in processed grains is much more readily absorbed pre-cecally than that found in ordinary sugary sweet grain mixes, vastly lowering the risk for colic, laminitis, tying up and other metabolic disorders related to fermentation of starch in the hind gut. Therefore, to maintain nutrient and caloric density but have safer feeds, today's contemporary products contain high levels of very digestible fiber and higher levels of fat than in the past. The result of using these products instead of the traditional "sweet feeds" can generally be measured by a reduction in metabolic growth and exercise related disorders that can be attributed excess energy coming from sugars in the diet. In addition, some horses are sensitive to increases in blood sugar and exhibit a "grain high", often becoming less tractable and excitable when fed high grain diets.

Feeds that are considered sweet feeds will contain a combination of grains mixed with molasses and may have a "premix" pellet or crumbles that contain protein vitamins and minerals. There is no added fat. Many different formulas exist, but they usually contain molasses about 4-12% with a mix of oats, shelled, cracked or flaked corn and sometimes barley. Sweet feeds may contain a considerable amount of shelled or cracked corn and most of this unprocessed corn is not digested in the foregut which can lead to the production of acid in the hindgut. Another consideration is that sweet feeds have a short shelf life due to high moisture content, become rock hard in the winter and attract flies in the summer. Sweet feeds are however, in very small amounts, good carriers for medications and supplements.

In contrast, high fiber and fat products will contain soluble fibers such as soy bean hulls, rice bran, alfalfa meal and beet pulp, a small amount of grain and molasses and fat from soy or corn oil. These feeds will also have a premix pellet or crumble to balance the protein, vitamins and minerals. High fiber and fat feeds may also contain a "High fiber pellet" instead of loose fiber. Generally these feeds contain a mix of natural grains and

processed ingredients which improves digestibility. A nutrient comparison of a traditional sweet feed and a high fiber/fat feed is shown in table 1.

#### COMPARISON TABLE of a sweet feed and a high fat/fiber feed

One feed ingredient that can be added to equine rations to enhance digestion of feeds that are high in fiber is viable yeast culture (*Saccharomyces cerevisiae* or Yea-Sacc 1026). Yeast culture is used to stabilize the hindgut bacterial populations and increase nutrient digestibility. Yeast culture synthesizes many proteins and secretes all essential amino acids.

Many studies have been conducted with horses as to the usefulness of this ingredient. Adding yeast culture to the diets of horses has been shown to enhance the activity of fiber-digesting bacteria in the hindgut, resulting in increased fiber digestibility and more efficient use of the vitamins and minerals derived from the forage portion of the diet. This is particularly important in the growing horse because calcium and phosphorus are essential dietary minerals needed for proper bone development.

Some of the phosphorus found in forages is bound to the plant fiber in the form of phytin phosphorus and is not readily digested and absorbed. Research studies have shown a 20% increase in phosphorus availability when yeast culture is added to the diet. Yeast culture stimulates the hindgut bacteria to produce the enzyme phytase, which acts to break down the bond between the fiber and the phytin phosphorus, making it readily absorbable from the hindgut.

Lactating mares fed yeast culture have higher concentrations of sugars, fats, proteins, and amino acids, and their foals were shown to have higher average daily gains due to increased availability of nutrients. Older horses will benefit directly from the addition of yeast culture due to increased fiber digestion and phosphorus absorption from the large intestine, which commonly deteriorates and loses some absorptive capacity due to aging.

In one research study, horses in training benefited greatly when being fed a diet with added yeast culture, with lower blood lactate levels before and during exercise and faster clearance of lactate from the blood following exercise than did the control horses not receiving yeast culture. Clearly, the addition of yeast culture to horse feeds is a win-win situation, as all classes of horses appear to benefit from its effects.

When horses need supplementation above forage to meet nutrient requirements feeds can be added to the ration. Sweet feeds have the benefit of being very palatable to horses, but higher fiber and fat feeds are safer, especially when feeding horses that require large amounts of feed.

Benefits of using a higher fat/fiber feeds over a traditional sweet feeds

- Horses exhibit stereotypic behaviors such as stall walking and weaving, as well as vices such as cribbing and wood chewing as a means to relieving stress.

- A large part of the problem can be attributed to the diet and feeding behavior of the stabled horse. Instead of grazing for 16-18 hours per day, the stabled horse may spend as little as 1-2 hours per day engaged in feeding activity.
- Many hours of non-feeding and idle time has been attributed to the occurrence of behavioral problems.
- Most horses in training are fed large quantities of grain (which contains a level of approximately 45-65% soluble carbohydrate, or, starch) in their rations because grains are traditionally more energy dense than forages. Feeding large amounts of grain can lead to starch overload in the hindgut and can result in metabolic disorders such as colic, laminitis, and insulin resistance.
- Feeding large amounts of grain is also associated with increased gut acidity. Some researchers believe that high grain diets cause low-level pain due to acidity in the gut which then serves as a stimulus for stereotypic behavior, in addition to gastric ulcer syndrome.
- Many horses with a propensity to tie-up will benefit from the addition of fat and fiber to the diet because it helps to lower the starch content of the diet, which may in turn decrease excitability and nervousness.
- Grain meal feeding is directly linked to an increase in serotonin, a brain neurotransmitter which modulates mood activity and alertness. High serotonin levels observed after eating meals high in starch has been implicated as the reason for sugar "highs" seen in some horses following a grain meal high in starch.
- Many other factors can affect behavior in horses such as sex, genetics, breed and environment, but it is fairly safe to say reducing starch in the diet of horses appears to play a role in improving mental and physical health of horses.

#### Dietary recommendations

- Grains are very palatable and high in digestible energy and should be incorporated in reasonable amounts in the exercising horse diet, as glycogen repletion and storage following maximal exertion is somewhat dependent on glucose provided in the diet.
- Ingredients like 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 create an increase in blood glucose when consumed, a biochemical reaction which in some horses seems to intensify the "sugar high" associated with feeding high grain diets.