

Energy Sources for Performance Horses

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Athletic horses enjoy performing. They seem born to run. Within the wide array of events in which performance horses participate, the intensity of exercise varies. Endurance horses must maintain their energy potential over relatively long distances of 50 to 100 miles per day, while racehorses, eventers, and many western performance horses work at a much higher intensity for shorter periods. No matter the event, performance horses must be fed properly to sustain their required energy needs.

Energy is the dietary nutrient that directly influences whether a horse can go the distance. Energy is a measure of a feed's potential to fuel body functions and muscle contraction during exercise. Since a horse cannot eat while performing exercise, it banks on the stored energy in its body to provide power for muscles. Energy is stored in the horse's body in the form of muscle and liver glycogen (sugar), and intramuscular and adipose triglycerides (fat). The body uses glycogen by breaking it down to glucose, which the muscle uses as an energy source.

During mild exercise, muscles utilize stored glycogen and fat. Muscle glycogen can be utilized when there is sufficient oxygen in the muscle cell as well as when there is insufficient oxygen. The body utilizes stored fat differently than glycogen. The body can only use stored fat during exercise under conditions where there is sufficient oxygen.

Horses performing intense exercise most likely experience cellular conditions of insufficient oxygen, where glycogen is the primary energy source. Under these conditions, lactic acid accumulates in the muscles, causing fatigue. Under intense exercise, horses do not utilize stored fat. Furthermore, fats cannot be converted to glucose or used to synthesize glycogen.

Therefore, it is important that performance horses maintain muscle and liver glycogen levels to provide energy during intense exercise. In addition, maintaining blood glucose levels during exercise is important because glucose is the only fuel available to the central nervous system (brain). Low blood glucose can cause fatigue in horses.

Dietary starch is the energy source of choice for regenerating muscle and liver glycogen. Dietary starch is broken down to glucose units in the small intestine, where it is absorbed into the blood. Glucose units in the blood are absorbed into cells where they can be used for muscle glycogen, liver glycogen, or fat.

There is a limit to the amount of starch that can be included in a performance horse's diet. Overfeeding starch in a single meal can overwhelm the intestine's ability to digest and absorb starch, resulting in a substantial amount of starch passing into the lower digestive tract. There, the starch is rapidly fermented to lactic acid by bacteria, which can lead to colic or laminitis.

In grain concentrate products for performance horses, fat from vegetable oils is being used as a source of energy to partially replace starch in the diet. There is less risk of digestive upsets with lower starch, high-fat grain concentrate products. Balancing the energy sources from starch, fat, and fiber is optimal for performance horses.

It does appear that performance horses adapt well to higher fat diets. Research trials suggest that feeding fat has a sparing effect on muscle glycogen in endurance horses. Horses appear to train their enzyme systems to better utilize fat in endurance exercise events, sparing the use of muscle and liver glycogen, therefore, delaying fatigue.

Fiber sources in the diet also provide energy to the performance horse. The hindgut with its billions of bacteria and protozoa ferment large quantities of fiber. The end product of this fermentation is volatile fatty acids (VFAs). These VFAs are absorbed from the hindgut and transported to the liver. Once in the liver, VFAs can be converted to glucose and stored as liver glycogen or be converted to fat.

Fiber sources, soy hulls, and beet pulp, contain large amounts of fermentable fiber, and have become important ingredients in grain concentrates for performance horses. These fiber sources are not only sources of energy for the horse, but safely dilute the starch concentration, thus reducing the risk of digestive upsets.

While technical in nature, the above explanation outlines the reasoning for the trend in feeding performance horses grain concentrate products containing less starch and higher fat levels with added fiber sources. OMEGATIN[®], a Kent Group product, was developed based on this concept and has been successfully fed to performance horse involved in intense training.