Dietary Fat and Controlling Rhabdomyolysis In Horses

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Many problems that people encounter with horses involve a number of factors interacting with one another. Problems associated with horses "tying up" or exertional rhabdomyolysis involve nutrition, management and genetics. Rhabdomyolysis is a condition indicated by horses stricken with muscle cramps after working. Mild forms of rhabdomyolysis cause discomfort while severe forms can cause death. Genetics and training influence the severity of this disorder. Certain breeds are more prone to this disorder than others. Heavy draft horses, thoroughbreds and some standard breeds are considered susceptible. The amount of exertion and prior training also influences the frequency and severity of the problem. Horses with periods of interruption in training are more vulnerable to this disorder than those on a consistent and steady program. Although the specific causes are not known, all cases appear to be related to an abnormality in carbohydrate metabolism.

Studies with humans and dogs under exertion exhibiting symptoms similar to horses with rhabdomyolysis. Most of the research involving muscular disorders associated with rhabdomyolysis has not provided any consistent patterns. Analysis of muscular tissues has indicated that an inadequate use of glycogen and other carbohydrates. In addition, there is an increase in the breakdown of muscle to supply protein for energy. The increased use of muscle protein for energy results in a loss of muscle mass and consequently, strength and speed of the horse.

Carbohydrates can provide fuel to tissues of both aerobic and anaerobic metabolism. Fat can only be metabolized under aerobic conditions. Under any conditions, fat provides most of the energy to muscle. More fat is needed as fuel when muscles are called upon to work. There are several physiological differences between horses that are in proper condition and those that are not conditioned properly. Horses that are in condition have muscles with a greater capacity to carry oxygen and blood than muscles from unconditioned horses. Differences also exist in the ability to store and metabolize fat. Unconditioned horses may rely too heavily on carbohydrates as an energy source, perhaps attributed to having muscles with a lower capacity for carrying oxygen than horses in condition. Under exertion, unconditioned horses that are genetically prone to carbohydrate abnormalities are more vulnerable to tying up. Damage to muscle associated with tying up may be related to an excessive build up of lactic acid as a result of a high rate of carbohydrate metabolism. Muscle damage may also be attributed to breaking down structural proteins for use as fuel. In any case, horses that are prone to tying up possess muscles that exhibit an abnormal type of metabolism.

Nutrition has been shown to play an important role in the onset of rhabdomyolysis. It

has been shown that reducing the contribution of carbohydrates as a source of energy by increasing fat levels decreases the incidence of tying up. Improvements have been documented for horses exhibiting mild forms of rhabdomyolysis one week after receiving a diet lower in carbohydrates and higher in fat. However, it has been observed that some horses showing improvement within weeks after receiving a diet change may have a relapse within a month. It may take anywhere from 3 to 6 months for the horse to fully benefit from the addition of fat to the diet. One must consider that changes in the enzyme profile of the gut, enzyme profile of the liver and muscle and modifications in the transport of fat capability are essential for the horse to properly utilize fat. In addition, it has been shown that adequate protein levels (12% minimum in the total diet) may be essential. No dire consequences in feeding protein at this level have ever been shown provided that adequate drinking water is available.

In summary, rhabdomyolysis is a condition in horses due to abnormal carbohydrate metabolism in the muscle. The exact cause is not known but nutrition, genetics and management have a role in this disorder. Effective preventive measures include a proper training regime and feeding a diet (hay and supplemental grain) that has fat contributing a minimum of 20 to 25% of the energy and a minimum protein level of 12%.