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### **Polysaccharide Storage Myopathy**

Polysaccharide storage myopathy (PSSM) is characterized by the irregular accumulation of the normal form of sugar stored in muscle (glycogen) as well as an abnormal form of sugar (polysaccharide) in muscle tissue. About 200 horses of Quarter Horse and warmblood/draft horse breeding have been identified with tying-up associated with polysaccharide accumulation in muscles. This disorder is inherited in Quarter Horses and breeding individuals with PSSM has produced affected offspring.

Horses with PSSM accumulate muscle glycogen due to abnormal glucose metabolism in their muscles. One aspect of the defect involves enhanced sensitivity of the muscles to insulin, resulting in more transport of sugar from the bloodstream to skeletal muscle. The diet can be adjusted to decrease the amount of insulin and sugar in the bloodstream. Carbohydrates that are high in starch, such as sweet feed, corn, wheat, oats, barley, and molasses, should be avoided and extra calories can be provided in the form of fat. An important part of the management of PSSM horses is daily exercise. This suppresses glucose uptake, enhances glucose utilization, and improves energy metabolism in skeletal muscle. If only the diet is changed, we found that approximately 50% of horses improve. If both diet and exercise are altered, then 90% of horses have had no or few episodes of tying-up.

#### **1. Minimizing stress and providing regular routines and daily exercise are highly beneficial.**

Turn-out each day for as long as possible with other horses will keep the horse active. The amount of time the horse is left in the stall should be decreased as much as possible. If there has been a recent severe episode of tying-up, I would turn the horse out for two weeks on the diet recommended below. Once the horse has been on the diet for two weeks, I would then begin longeing once a day for five minutes at a walk and trot. Gradually increase the time by two minutes each day. If the horse seems stiff, slow to a walk and see if the stiffness persists. If the horse is stiff, stop there; if not, continue after a two-minute walk. When the horse can exercise for 15 minutes, give it a five-minute break at a walk, and gradually increase walking and trotting after this. Once the horse has reached 30 minutes of trotting on a longe-line (with a break at 15 minutes), I would ride the horse for 20 to 30 minutes and gradually increase the length and intensity of exercise. At least three weeks of groundwork will precede any mounted exercise. Keeping the horse fit will change the muscle metabolism, and this seems the best prevention against further episodes of tying-up.

**2. Adherence to a strict diet will also help horses with PSSM.** A high-quality grass or oat hay should form the basis of the diet. If alfalfa hay is fed, a mixture (half alfalfa and half grass or oat hay) may be best. A vitamin and mineral supplement that contains vitamin E and selenium is also beneficial. Before buying an additional supplement, however, make sure that there is not already enough selenium and vitamin E in the supplements recommended below. Eliminate grain and sweet feed from the diet and replace these calories with a fat supplement. Most horses find rice bran palatable. Rice bran is rich in calories, due to its 20% fat content, and may be fed at a rate of one pound per day for horses in light training and up to 4 pounds per day for horses in intense training. A vitamin/mineral supplement that balances the calcium to phosphorus ratio is sold with these feeds. Corn oil can also be a source of calories. Two to three cups can be given daily over alfalfa pellets or in a mash. Begin with a small amount of corn oil and gradually increase the amount daily so that horses become accustomed to it.

Sources of fat for equine diets include:

- A) Equi-Jewel (a heat stabilized rice bran) along with 0.25 pound per day of Micro-Phase supplement made by Kentucky Equine Research (1-800-772-1988).
- B) Re-Leve\*\* made by Hallway Feeds (1-859 255-7602). This is recommended for more finicky eaters and horses in heavy work. One to three pounds can be fed to most horses in light to moderate work; six to 10 pounds can be fed to thin horses in heavy work along with grass hay.

In addition to a salt block in the stall, an electrolyte supplement should be offered to horses in hot, humid weather.

Many horses with this muscle disorder have recurrent episodes of tying-up. At present, the best we can do is to manage the condition so that recurrence is kept to a minimum. Several of the horses that have been put on the rice bran supplement and this training regime have responded well and are competing in pleasure and hunter/jumper shows.

\*\* A portion of the profits from Re-Leve is contributed to the University of Minnesota and Stephanie Valberg to advance research of PSSM.