



***NUTRITION AND OTHER TOPICS OF INTEREST TO THE HORSE INDUSTRY.***

## **Nutritionally-affected conditions of horses**

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With continuing advancements in equine nutrition and veterinary medicine, we are able to better understand many disorders that can be influenced by dietary manipulation. Some of these conditions include equine polysaccharide storage myopathy, laminitis, equine metabolic syndrome/insulin resistance, hyperkalemic periodic paralysis, and grain allergies/sensitivities. These conditions should be diagnosed by a veterinarian. Once a diagnosis has been made, having some understanding about the pathology of these disorders will help in making decisions about how best to meet the horse's nutritional needs.

### **Equine Polysaccharide Storage Myopathy (EPSM / PSSM / EPSSM)**

EPSM is a genetic disorder considered to be a form of tying-up. Horses diagnosed with EPSM have an accumulation of glycogen in skeletal muscle. While mainly seen in draft and warmblood breeds and crosses, EPSM reportedly has been diagnosed in several other breeds, including Quarter horses, Morgans, and Arabians. Symptoms can include muscle spasms, an awkward gait (especially in the hind limbs), muscle atrophy through the rump, profuse sweating, and a reluctance to move. These symptoms may occur at any stage of life and usually occur after exercise, although some horses have exhibited symptoms with no exercise. Episodes may be infrequent or every time the horse is worked. Definitive diagnosis is done by genetic test or a muscle biopsy to look for abnormally high glycogen concentrations in muscle cells.

#### *Energy metabolism and EPSM*

Understanding energy metabolism will help to better understand how EPSM affects the horse and the need for diet alterations. When the horse consumes sugars and starches, most of them are broken down to glucose and absorbed. Muscle cells store energy in the form of glycogen (many glucose units linked together). Muscles can use glycogen as an immediate energy source to support exercise. With EPSM, muscles lose the ability to utilize glycogen, resulting in glycogen accumulating in the muscle. Concentrations as high as 1.5 to 4 times higher than normal have been reported. The abnormally high glycogen concentrations are thought to impair the muscle's ability to maintain normal muscle fiber size, thereby impairing muscle function.

### **Laminitis/laminitis-prone conditions**

#### *Laminitis (founder)*

Laminitis is perhaps one of the most confounding disorders affecting horses. Laminitis is a debilitating disease resulting from interruption of blood flow to the sensitive laminae in the hoof. The interruption causes the coffin bone to separate (rotate) from the hoof wall. The actual cause of this interruption in blood flow is unknown. Many situations and disorders can result in laminitis; but in terms of nutrition, overconsumption of sugars and starches, whether from grains/feed or lush pastures, is one of the most common causes. Again, the mechanism by which this results in decreased blood flow to the laminae is poorly understood.

### ***Equine Pituitary Pars Intermedia Dysfunction/Cushing's Disease***

Cushing's Disease is caused by a benign tumor on the pituitary gland. The disease most commonly occurs in horses over 20 years of age, although it has been confirmed in horses as young as 7 years old. The most common symptoms include abnormal hair growth (very long, wavy and coarse), reluctance to shed, obesity, excessive drinking and urination, and frequent and recurrent laminitis.

### ***Equine Metabolic Syndrome/Insulin Resistance (IR)***

Equine metabolic syndrome is characterized by obesity, insulin resistance, and recurrent bouts of laminitis. The exact cause is unknown, although some theories include a genetic predisposition (i.e., certain breeds appear to have a predisposition), chronic obesity, and possibly age, to name a few.

One of the symptoms of EMS is insulin resistance. Insulin is a hormone that facilitates the uptake of glucose by fat, liver, and muscle cells. As explained earlier, some dietary sugars and starches are broken down to glucose, which is absorbed from the digestive tract and enters the bloodstream. Insulin is secreted by the pancreas in response to an increase in blood glucose. For reasons that are not clearly understood, cells become less sensitive to insulin. As a result, the body continues to produce more and more insulin to help regulate the amount of glucose in the blood. In the short term, the increased insulin production helps maintain proper blood glucose concentrations. Over time, however, the increased insulin cannot maintain proper blood glucose, resulting in high blood insulin and glucose concentrations. This means that glucose is not properly taken up by cells.

Insulin resistance can result in physical changes in affected horses. Insulin resistant horses are commonly obese, with cresty necks and unusual fat deposits behind the shoulder and at the tailhead. They often lack muscling and are lethargic, likely due to the lack of conversion of glucose to usable energy (glycogen). (Note: While obesity is a common characteristic of IR horses, not all obese horses are IR. Likewise, not all IR horses are obese.) Insulin resistant horses are prone to frequent and recurring bouts of laminitis.

Besides the physical symptoms and/or recurrent bouts of laminitis, measuring blood glucose and insulin concentrations can be used as diagnostic tools. Care should be taken, however, as many factors can affect these concentrations and give misleading results.

### ***Feeding horses with EPSM, Laminitis, Cushing's Disease, and/or IR***

While EPSM, laminitis from overconsumption of grains and/or lush pastures, Cushing's Disease, and Equine Metabolic Syndrome/IR are different disorders, the dietary alterations necessitated by these disorders are very similar. Horses with any of these conditions need diets low in sugars and starches. For most horses, a diet below 15% sugars and starches is generally acceptable. Caution should be taken, however, due to testing variations from lab to lab and differing sensitivities of some horses. Typical grains (oats, corn, barley, etc.) and molasses should be avoided. Because many of these horses tend to be overweight, dietary calories also need to be minimal. A comprehensive vitamin and mineral supplement with grass hay will usually meet their dietary needs. (Pasture recommendations are discussed below.) For horses that require more than forage alone to maintain a healthy body condition, fat and digestible fiber provide safer sources of calories. These include flaxseed, rice bran, vegetable oils, beet pulp (without molasses), soybean hulls, etc.

Care should be taken with lush pastures that contain significant sugar and starch concentrations. While such concentrations may exist any time during the year, spring and autumn often pose the highest risk. Some laminitic-prone horses can be safely maintained on pasture when wearing a grazing muzzle. Others are not able to tolerate any pasture consumption and must be maintained on a dry lot and fed hay. Hay should be tested to confirm sugars and starches are below 15%. For overweight horses, grass hays are usually preferred over legume hays because legumes are typically higher in calories. Even though some legume hays test in the safe range for sugars and starches, a number of laminitis-prone horses have experienced episodes when consuming such hay. The episodes seem to be horse-specific, and the reasons behind these episodes are unknown.

### **Hyperkalemic Periodic Paralysis (HYPP)**

HYPP is a genetic disorder in Quarter horses and Quarter horse crosses. It is most commonly seen in heavily muscled horses. HYPP is a co-dominant disorder, meaning that horses possessing one copy of the HYPP gene can show symptoms. HYPP is characterized by muscle tremors, loss of muscle control, general weakness, paralysis, and collapse. Affected horses may also experience labored breathing, thought to be the result of paralysis of the airway muscles, causing death in extreme cases. Diagnosis can be made via a genetic test for the gene.

#### *What happens during an HYPP episode?*

Under normal circumstances, the concentration of sodium is high outside the cell (e.g., in the bloodstream), while potassium is higher inside the cell. The movement of these two electrolytes into and out of the cell is tightly regulated by the body. The HYPP gene affects the muscle cell membrane sodium channels (pores) that control this regulation, and sodium begins to leak into the cell. This triggers potassium to exit the cell and enter the bloodstream. HYPP horses are often found to have high potassium in their blood during an episode. This increase in blood potassium hyper-excites the muscle, resulting in near-constant muscle contraction. Initially, this means that the horse's muscles appear to tremble or twitch. Eventually, as more potassium enters the bloodstream, muscles lose the ability to contract, and the horse becomes paralyzed. If this occurs to the muscles controlling the respiratory system or to the heart muscle, such an episode could prove fatal.

#### *Feeding horses with HYPP*

High blood potassium appears to be a trigger for an episode; therefore reducing dietary potassium is key. The general recommendation is for a diet with no more than 1% potassium. Common dietary components that are high in potassium are legumes (clover and alfalfa), molasses, some salts ("lite" salt), and electrolyte supplements. Hay should be tested to confirm that potassium concentrations are low. Grains (e.g., oats and barley) and beet pulp without molasses are safe sources of calories for HYPP horses, but should be balanced with a comprehensive vitamin and mineral supplement that is low in potassium. Caution should be used in allowing HYPP horses to graze lush pastures, particularly those containing clover or alfalfa.

### **Grain/forage allergies and sensitivities**

Though uncommon, some horses can experience allergies or sensitivities to certain grains and forages. Feedstuff allergies are poorly understood in the horse. A true food allergy suggests the horse has an immunologic response to a feedstuff. Methods of testing are often difficult and unreliable, and "allergies" are often over-diagnosed.

The most commonly reported clinical sign of an allergy is itchy skin. Other reported symptoms include non-itchy, inflamed skin; edema; crusty, red skin; hives; hair loss; and digestive symptoms (e.g., diarrhea, colic, weight loss). None of these symptoms are exclusive to an ingested food-related allergy and are common symptoms of other ailments.

#### *Diagnosing grain/forage allergies and sensitivities*

Diagnosis usually involves either serum or intradermal testing. Both are unreliable in identifying ingested food-related allergies and give many false results. The above listed symptoms could also be reactions to parasites (internal or external) or external irritants (e.g., pollen, mold, fly spray, etc.). The only reliable method to diagnose an ingested food-related allergy is an elimination diet. This involves introducing food challenges, beginning with a single protein and carbohydrate source and slowly adding other sources over time. Such challenges generally take several months to complete.

#### *Feeding for grain/forage allergies and sensitivities*

If a food allergy or sensitivity has been confirmed, then avoidance is the only dietary route. Finding alternative energy and protein sources may prove challenging for horses with higher requirements.

### **Summary**

Many maladies to the horse can be affected by the diet. If you suspect your horse has an issue, then the first step is to contact a veterinarian for a definitive diagnosis. Understanding the etiology is important in treating the horse. Working in conjunction with a veterinarian for proper medical treatment and with a nutritionist to achieve the proper diet can help restore the horse to a healthy state.

*Customer Focus:*

ED CROTHERS  
CEDAR BROOK FARM  
WEST UNION, OHIO

Ed Crothers, owner of Cedar Brook Farm in West Union, Ohio has broken and trained over 3100 horses in the last 16 years. One of the more famous horses he has broken and trained was Arctic Bright View, also known as one of the horses that played the role of "Silver" in The Lone Ranger movie released in December 2013.



During his career, Ed has repeatedly seen the same problem with horses...a well trained horse that has won numerous competitions and awards or that has been a wonderful riding partner has developed a bad attitude. Ed's breaking and training philosophy is centered around these horses. The reasons behind the attitude change are fully explored and corrections are made. Many times the problems are solved and the "good horse" returns by the end of a session.

Over the years, one of Ed's biggest challenges was keeping all the horses shipping into and out of the farm in good body condition. Ed changed feed companies three times in two years in an attempt to improve the horses' condition and appearance. He constantly had horses "on max daily feed plus extra supplements, such as protein and fat," but he was still not satisfied. Every feed company gave him the same promises: "Their feed was the best, and we would start cutting back [the amount] after a few weeks. Well, that never happened." He was very frustrated.



According to Ed, "All of that changed when a McCauley's rep walked into my office. He promised me all the same things the other feed reps did. The only difference is, he kept all of his promises. After about two weeks of feeding McCauley's feed (WB 100), I started to notice a difference in all the horses. I was able to completely do without all the extra supplements. After about four weeks, I had to start cutting back on feed on most of the horses. Along with the weight gain, I also noticed better hair coats, great top lines, and horses that came in with poor feet would leave with healthy hooves. I call McCauley's the 'smart feed.' Feed McCauley's and your horses will look so good, you look really smart!"

For more information about the Crothers' Way, visit [www.goodhorsegonebad.com](http://www.goodhorsegonebad.com).



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