

Laminitis is most commonly caused by the feeding of grass and/or grain and is actually a toxic metabolic disease that weakens the hoof structure. The relationship between feed, digestion and hoof health will be discussed. Learn how to heal laminitis and metabolic syndrome successfully through diet, therapeutic nutrition and colon detoxification.

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A complex condition and number two cause of death in horses, laminitis is related to the over-feeding of grass and grain and is actually a metabolic disease that affects the laminellar tissue, specialized tissue that ensures the structural integrity of the hoof by adhering the coffin bone to the inner hoof wall. Because of the highly vascular nature of the horse's hoof it is extremely susceptible to inflammation and damage especially from digestive toxicity resulting from the over-feeding of starches and sugars. The lamina becomes stressed from high blood sugar levels as well as leaky gut syndrome where the bacteria, acids, and toxins migrate from the hindgut to the hoof, initiating damage. Once the laminar tissue becomes weakened the connection between the hoof wall and coffin bone separates causing pain and inflammation. If left unchecked the coffin bone eventually drops - at which point it is labeled as founder.

The three major factors that trigger laminitis as caused by the feeding of high starch grains, and grass and hay which are high in sugars are:

Cecal Acidosis aka "Leaky Gut"

Sugars and starches are normally digested with enzymes in the small intestine. When large amounts of sugars and starches are fed, the small intestine cannot digest them all at once thus the digestive load is forced back into the cecum to ferment. The excess fermentation causes abnormal levels of gas (often causing colic), heat and acids. These destructive lactic acids

destroy beneficial bacteria (probiotics) but are favoured by harmful strains of bacteria such as Salmonella, Streptococcus, and E. Coli as well as yeast cells. These bacteria then produce a variety of different toxins that are very damaging to the colon walls.

This cocktail combination of gas, heat, and acid, is known as caecal acidosis, a condition that not only permanently disrupts the natural balance of microflora by killing off beneficial bacteria and encouraging the growth of unfriendly bacteria, but damages the intestinal lining of the colon making it abnormally permeable. This damage can happen as early as 24 hours after a starch overload or gradually over a period of several weeks. Known as "leaky gut syndrome" the damaged colon allows the migration of bacteria, yeast, acids, and related toxins to "leak" across the membranes, out of the colon and into the general body systems including the liver, kidneys, heart, muscles, immunity, and the ever-sensitive laminellar hoof tissue. This damaged colon is a major cause of laminitis which will not heal unless the colon is repaired.

(Besides laminitis a variety of other health conditions are due to leaky gut as well: arthritis, fatigue, allergies, skin conditions, bloating, chronic colic, hormone imbalances, undiagnosed joint and muscle pain, and auto-immune conditions. All of these conditions are a result of colon toxicity through modern feeding practices, lack of exercise, chemical deworming and antibiotics.)

Insulin Resistance

When a horse (or human for that matter) ingests sugar or starch the blood receives sugar very rapidly from the small intestine. Once in the bloodstream the sugar must find its way into liver and muscle cells where it is either burned for immediate energy or is stored as glycogen and used later. In healthy animals this is accomplished with insulin, a hormone produced by the pancreas that regulates blood sugar by attaching itself to specific receptors in the liver and muscle, thereby opening those receptors and allowing the passage of sugar from the blood into the tissues. Eventually, in the presence of a long-term high sugar diet, these cell receptors become damaged by increasingly high insulin levels, at which point they can no longer open - the receptors are now resistant to the effects of insulin.

With nowhere else to go, these sugars must now convert immediately to fat, via the liver, and the easy keeping "sugar hound" becomes very efficient at storing excess blood glucose in the form of a crested neck, fat pads (eyes, shoulders, and hindquarters) and pot bellies. These fat pads are actually a sign of an overloaded "fatty liver" that pops out fat globules. Once the fat stores become saturated, the blood sugar levels increase permanently; the pancreas can no longer produce enough insulin and the insulin levels drop from an insulin resistance high to a

hormonal low. This condition of high blood glucose and insulin deficiency is known as diabetes mellitus, or Type II diabetes. The insulin resistant horse can also exhibit signs of excess thirst, frequent urination, fatigue, depression, and/or excessive hunger.

Once blood sugar levels remain permanently high, the sugar levels in all the body tissues drop; this is bad news for the hooves since the laminar tissue is now starved for sugar resulting in the separation and stretching of the lamina.

Cushing's Syndrome

It is at this stage that horses go beyond blood sugar imbalances and progress on to what I consider a true Cushing's profile. Cushing's symptoms appear as curly hair, incomplete shedding, and/or sweating.

The imbalance of blood sugar and insulin levels causes the adrenal glands (one above each kidney) to increase their production of cortisol – a steroid like chemical that act as a natural anti-inflammatory and anti-stress hormone.

Long term levels of increased cortisol will signal the pituitary gland at the base of the brain, to increase levels of ACTH (adenocorticotrophic hormone) which signals the adrenals to produce more cortisol. Cortisol is regulated by ACTH, therefore high levels of cortisol will, in turn, signal the brain to secrete more ACTH. Thus the hormone imbalance perpetuates itself through a circular pathway.

Not only are cortisol levels influenced by blood sugar imbalances; they are also elevated by stress, which triggers the immediate release of cortisol. This is nature's response to "fight or flight" reactions and is meant to protect from danger by increasing blood pressure and breathing rate, tensing the muscles, and maximizing vision. Unfortunately, if the cause of stress is not removed (consider the horse suffering from confinement, loneliness, over-training, physical pain, or just the pain of laminitis for that matter) the continued release of cortisol puts an "easy keeper" at risk and/or maintains already high blood sugar levels (to increase available energy). The aged horse is particularly prone to this since the older horse is unable to turn off the cortisol response to stress as quickly as the younger horse.

The effects of elevated and excessive cortisol levels are:

a) high blood sugar leading to laminitis

b) depressed immunity – a complication of high blood sugar, poor immunity lowers an effective response to bacterial infections and toxicity. This also affects the resistance of the lamina leading to damage and separation

c) muscle wasting from protein loss

d) poor integrity of the laminar tissue from protein loss

e) osteoporosis

f) weight gain

The use of synthetic steroid medications (eg. dexamethasone, cortisone injections, cortisone creams) have the same negative effects and are therefore contraindicated in horses with metabolic syndrome, cushing's or laminitis. Conversely, those horses that are on steroids should not be fed any kind of sugars or high starch feed.

Metabolic Syndrome, as in insulin resistance and cushing's, is most often seen in those horses that are overweight and are considered "easy keepers". The reason that "easy keepers" are "easy" is due to ancestry and include ponies, desert breeds, and mountain horses that are metabolically adapted for survival in harsh, low nutrient environments rather than in a lush sugar-laden pasture with sweet feed for dessert. The "easy keeping breeds" include all ponies and minis, Fjords, Icelandics, Arabs, Mustangs, and gaited horses.

Metabolic syndrome in horses is not a disease of the pituitary, rather, it is a result of modern horsekeeping! □ □

Laminitis – Nutritional Treatment Program

1) The reduction of dietary sugars through the elimination of grain, and grass and hay with high sugar content. Eliminate alfalfa as well – fermentation of excess protein will also cause colon damage. If tolerated, soaked beet pulp will increase fibre and slow down sugar absorption. (Beet pulp will cause diarrhea in some horses). Don't use dietary fats and oils.

2) Feed horses small amounts of food frequently – 4x-6x daily. A hungry horse is a stressed horse that will damage her digestive system.

3) Watch for food allergies – during the laminitic episode the immune system becomes compromised resulting in hay, grain and/or supplement allergies causing further inflammation.

4) Encourage plenty of exercise – a laminitic horse should not be confined. Exercise encourages improved digestion, increased hoof circulation, and relieves stress.

5) Avoid the use of antibiotics, non-steroidal anti-inflammatories, glucosamine, and chemical dewormers, all of which either alter the probiotic balance, damage the intestinal mucosa, or elevate blood sugar.

6) The health of the horse's feet is paramount – those horses with poor quality feet and/or unbalanced trims are very susceptible to metabolic damage in the hoof. Ensure adequate hoof mechanism and circulation by consulting a barefoot trimming specialist with experience in healing laminitis and founder.

