Equine Laminitis Informational Handout

What actually is laminitis?

Laminitis literally means inflammation of the laminae of the horse's foot. Laminae refers to the insensitive and sensitive tissue that is located between your horse's hoof wall and coffin bone. The laminae are tiny finger-like structures that interlock and secure the coffin bone to the hoof wall and keep the bone in place. If your horse's blood flow to these laminae is disrupted, inflammation occurs that weakens the laminae structures and interferes with the hoof wall to bone bond, making the laminae unable to hold the coffin bone in place. Laminitis can affect one or all feet, but it is most often seen in the front feet simultaneously.

If the weight of the horse overcomes the cohesion between the two sets of interdigitating laminae in the front (dorsal) part of the hoof, the case turns from laminitis to acute founder. This is where the weight of the horse pushes the coffin bone towards the ground and the pull of the deep digital flexor tendon rotates the coffin bone downwards. This process is extremely painful to the horse and can be easily diagnosed by feeling a depression above the dorsal coronary band. In some cases the coffin bone will protrude through the sole of the hoof, which is called solar prolapse.

Causes

While the exact mechanisms by which the hooves are damaged and trigger laminitis remains uncertain, there are several situations that are known to result in the onset of laminitis including nutritional, hormonal, and mechanical factors.

Obesity Dependent Laminitis: The main cause of laminitis in horses in Australia and in most parts of the developed world is Obesity Dependent Laminitis (ODL). The media has made a significant push on the unfortunately high rate of human obesity but companion animals such as horses, dogs and cats are also suffering from alarming rates of obesity. Obese or overweight animals are putting unnecessary strain on their heart, lung, and joints, and horses are no exception. Incidences of ODL and insulin resistance are greatly increased when animals are chronically overweight.

Insulin Resistance: Insulin is a hormone involved in the regulation of glucose (sugar) levels in the blood and tissues of the body. In response to feeding, insulin is secreted by the pancreas into the bloodstream. Insulin in the bloodstream directs the glucose absorbed from the food into the body's tissues including liver, fat, and muscle. Insulin resistance occurs when insulin no longer has a normal effect on the tissues. In the insulin resistant horse, the pancreas releases insulin into the bloodstream, and the insulin arrives at the tissues and binds the cells as normal. However the glucose enters the tissue cells at a much lower rate than normal. This lower rate of glucose uptake into tissues results in higher levels of blood glucose. Horses and ponies compensate for insulin resistance by secreting even more insulin into the bloodstream in order to keep the blood glucose concentration within the normal range. Therefore, horses and ponies with equine metabolic syndrome (EMS) have a higher concentration of insulin within the blood, which can be measured to determine if insulin resistance is present. Research has shown insulin resistance to be a major contributing factor in the development of laminitis in horses.

Nutrition Induced Laminitis: Another common cause is nutritionally induced laminitis through carbohydrate overload. The horse has evolved to digest carbohydrates, starches, and sugars in the small intestine and fibre in the hindgut. However, if the capacity of the small intestine is exceeded, the digestion of these sugars and starches overflow into the hindgut where they upset the microflora which in turn increases the acidity of the hindgut. The bacteria designed to utilize lactic acid cannot keep up with those producing it and die off, creating a toxic environment. The toxins are then released into the bloodstream via an apparently leaky hind gut epithelium. Certain types of horses are prone to this type of laminitis such as easy keepers (gain weight despite restricted carbohydrate/feed), horses with crested necks, obese, or insulin resistance horses.

Feeds rich in carbohydrates are quite energy dense, which means a horse can easily consume more carbohydrates than its body can handle. Carbohydrates found in equine diets can be divided into two types: Structural and Non-structural. Structural carbohydrates are often referred to as fiber and are critical in the equine diet. Non-structural carbohydrates (NSC) are sugars and starches that are broken down by enzymes in the horse's small intestine into glucose. Common examples of non-structural carbohydrates in horse diets include cereal grains (oats, corn, barley, etc), molasses and short 'lush' pasture. Research has shown that metabolic disorders such as obesity, insulin resistance, laminitis, Cushing's disease, tying-up, and behavioural excitability are associated with excess NSC (sugar and starch) in the diet. Expert nutritionists and veterinarians researching in this field have determined "low carb" to be less than 10% NSC of the horse's overall diet.

The other type of carbohydrate that has received a lot of attention lately is fructan. Fructans are fructose and glucose joined together into various lengths and configurations. Fructans of short length are called oligosaccharides. Horses do not have the enzymes to break fructans down so they need their hindgut bacteria population to do it. Fructans are extremely fermentable and if large meals of fructans are consumed it could quickly cause gas colic, scouring, and laminitis. Fructan levels in pasture grass can change throughout the day and are at their highest in the late afternoon, especially in mild climates and also in mornings after a frost. For horses predisposed to laminitis, it is important to closely monitor pasture conditions or reduce turnout time on pasture during spring, autumn, and after frosty conditions as fructan levels can fluctuate dramatically.

Other factors: Laminitis can occur due to many reasons such as equine metabolic syndrome, Cushing's disease, excessive weight bearing, concussion, fillies and mares coming into season, cold weather, serious cases of colic, infections and toxaemia, retained placenta, and drug inducement. Laminitis can be a multifactorial problem that in some cases is very hard to predict.

Clinical signs of Laminitis

Signs of the early onset of laminitis include an increase in strength of the horse's digital pulse along with an abnormal gait. To check your horse's digital pulse, place two fingers in front of the sesamoid bones at the level of the fetlock and feel the pulse. A strong bounding digital pulse is a sign of inflammation. Make sure to feel and monitor the horse's supra-coronary contours above the dorsal coronary band for any depressions. Heart rate should also be checked, as it is a direct indication of a horse's pain. This can easily be found using the digital pulse or by placing

a stethoscope in the left armpit and listening for the beat. A comfortable horse has a heart rate between 25-45 beats per minute. A heart rate above this indicates pain and/or stress. It is important to understand that it is not just one single sign that indicates laminitis. Rather, it is a range or combination of the aforementioned symptoms that indicate the presence of the disease.

A strong indicator for acute laminitis is the shifting of weight between the right and left legs and signs of lameness when your horse is turned in small circles. You may not be able to see any signs when walking the horse in a straight line, but small turns put more pressure on the front feet, enhancing the signs of possible lameness. Your horse is in severe pain when he is reluctant to move and looks like he is walking on eggshells. In cases where the front hooves are affected, horses generally try to lift pressure off their front toes by stretching their front legs to the front and position their hind feet under them to support the weight that their front feet cannot carry anymore.

Feeding Management & Prevention

We must carefully manage pasture turnout, roughage, and grain intake in horses and ponies that are at risk of developing laminitis or are currently affected. Horses suffering from insulin resistance (IR) and/or Cushing's Disease as well as horses and ponies with the "easy keeper" phenotype are often overweight or obese. These horses may be persistently hyperinsulinemic (excessive insulin in the bloodstream) and should also be managed carefully with regard to their carbohydrate intake.

The following points summarize current advice regarding strategies for avoiding high NSC intakes by horses and ponies at risk for pasture laminitis:

-Animals predisposed to laminitis should be denied/have restricted access to grass pastures, particularly during the spring and autumn when pasture growth is at its peak.

-At other times of the year, limit the amount of turnout time each day (e.g., 1-3 hours) and turn horses out late at night (after 10:00pm) or early in the morning, removing them from pasture by midmorning at the latest (before 10:00am, because NSC levels are likely to be at their lowest late at night through early morning).

Alternatively, limit the size of the available pasture by use of temporary fencing to create small paddocks or use a grazing muzzle.

-Do not turn horses out onto pasture that has been exposed to low temperatures in conjunction with bright sunlight, such as occurs in the autumn after a flush of growth or on bright cool winter days, because cold temperatures reduce grass growth, resulting in the accumulation of NSC.

-Many people simply put the horse on a "starvation ration" and severely limit the horses' diet of all nutrients. This is one of the worst things you could do as horses still require maintenance energy to function as well as essential amino acids, vitamins and minerals to assist in repairing damage caused by laminitis. At a bare minimum your horse requires approximately 1% of his own body weight as roughage. Ideal roughage sources include native warm season grasses such as Kangaroo or Mitchel grass, Lucerne hay, grass hay and alternative highly digestible fibre sources such as beet pulp (HYGAIN MICRBEET).

Now that we have established the base of the diet for a horse prone to laminitis or currently suffering from the disease we need to look closer at the nutrient profile in terms of the horse's

vitamin and mineral requirements. Overall make sure you avoid high sugar and starch feeds such as any type of grains and spring pasture. As a general guideline look for balancer products such as HYGAIN BALANCED or HYGAIN SPORTHORSE or high fibre fortified pellets with a combined sugar and starch level of less than 10%. HYGAIN ZERO is a fantastic choice as it has a starch content of less than 1.5% and a sugar content of less than 4.5%, one of the lowest in the world.