Feeding After Laminitis (Founder)

By Dr John Kohnke BVSc RDA

Many horse and pony owners often battle for months to restore the hooves and improve the gait following a bout of founder. Horses and ponies that have suffered a single, or recurring episodes of laminitis, or the more serious structural hoof changes associated with pedal rotation as in founder, require careful dietary management to reduce the risk of further episodes of founder, as well as to promote the regrowth of affected hooves as the animal recovers. A prior episode of founder increases the likelihood of further episodes as hoof structure and circulation is often compromised.

The Underlying Cause

Early Spring Founder

Winter grasses that are boosted in growth by warmer, early and wet Spring conditions after rain or irrigation , with cool nights and warm days, often become lush and highly productive. **Lush pasture, especially ryegrass, phalaris and fescue dominant pastures, are considered high risk pastures, as well as succulent, rapidly growing clover in pastures in early Spring.**

These grasses can accumulate large amounts of non-structural carbohydrates (NSCs) in the form of fructan sugars. Under cold overnight and early morning conditions, the fructan sugars are not translocated into the plant stems for growth. Horses do not secrete an enzyme in their small intestine that can digest the chemical bonds in fructan sugars to release glucose, so that large amounts can be overloaded (dumped) into the voluminous hindgut. Fermentation bacteria can break the bonds, with the secondary production of D-lactic acid, a non-absorbable, non-metabolisable acid, which can accumulate in the hindgut digestive mass. This acts to lower the hindgut pH and suppress normal fermentation, with the death of large numbers of hindgut microbes and damage to the barrier function of the hindgut lining. A toxin is also produced by the lactic acid producing bacteria and other dying bacteria, which when absorbed into the blood stream, circulates to the hooves to interfere with the blood supply to the lamina and devitalise the basement membrane attachment of the laminae. The weakened lamina attachments are torn apart by the continuous downward rotation "pull"of the deep flexor tendon attached under the pedal bone.

Handy Hint

Many overweight ponies and horses suffering from Equine Metabolic Syndrome (EMS) or Equine Cushing's Disease in elderly horses, develop a "metabolic" form of founder due to glucose intolerance (secondary diabetes) and insulin resistance, which increases the risk of sugar overload and insulin –induced laminitis. These horses should be given specific treatment to reduce the risk of EMS and Cushing's induced laminitic episodes. Careful grazing management during high risk periods is essential to avoid repeated episodes of laminitis.

Late Spring and Autumn Founder

Pastures that regrow after rain under warm conditions can store large amounts of NSC carbohydrates, which can be digested in part in the small intestine to cause "spring fever" or excitement, as well as overload into the hindgut and risk of laminitis or founder. A similar process occurs when horses consume excess grain starch from high grain rations or greedy eating habits, or are 'grained up' too quickly in early training.

Steps to Avoid Laminitis

The management goals in preventing 'grass' founder should be observed from the start of Spring or following late summer rains, when pastures are likely to produce either fructan sugars (Spring pastures), or high amounts of soluble carbohydrates, that overload into the hindgut of grazing horses (Autumn pastures).

1. **Restrict access to lush spring pastures** to 1 ½ hours in the early to mid-morning (after the dew has dried off and the warmth of the sun enables the plants to utilise stored sugars for growth) and again in the mid to late afternoon, as the peak production of fructan sugars in the leaves of plants synthesised by sunlight photosynthesis, occurs over the late morning to mid afternoon period.

Handy Hint

Do not leave susceptible horses and ponies out to graze overnight during cool nights or on lush pasture. Although, the concentration of fructan sugars in the leaves decreases at night as they are transferred to the plant stems, horses and ponies often instinctively graze fro 2-3 hours in the early evening and can consume large volumes of high sugar grass. Even if hay is offered in the evening to reduce the desire to graze, many ponies will instinctively graze in the early evening after consuming their hard feeds and hay.

2. **Always soak good quality grass hay**, eg. grass and clover hay grown in early spring which can contain high levels of fructan sugars or soluble carbohydrates, for 1 hour in double its volume of luke-warm water. Soaking in this way can remove up to 33% of the fructan and NSC sugars from grass hay and 25% from lucerne hay. Remove and air dry to drain away the water, or tease out the hay on a wire netting - soak in the morning, drain during the day for the evening feed, and vice-versa. Do not add the soaking water to the

feed. Ensure that the hay is free of mould or a "musty" smell for up to 60 minutes after soaking or until it is dry. A polywoven chaff bag is a suitable soaking bag to reduce leaf loss and a hay net can be used to air dry the soaked hay. Note: If hay (or chaff) is soaked on a regular basis, soluble nutrients such as calcium, trace-minerals, salts and vitamins will be leached out of the hay. These should be replaced in the feed with a salt mix (eg Cell-Salts) and a trace-mineral and vitamin supplement (eg Cell-Provide or Cell-Vital)

3. **Offer chaff (avoid large volumes of good quality (high carbohydrate) oaten chaff – soak if necessary) or 'soaked' hay before turning out to graze in the early morning or late afternoon** to fill the horse's stomach and limit the rate of fill when grazing, as well as dilute the intake of fructan grasses.

4. **Consider the daily use of Virginiamycin (Founderguard)®** to suppress D-lactic acid producing bacteria and the cascade of damaging bacterial toxins during high risk periods Although, Founderguard can help prevent the onset of laminitis, it should also be supplemented after the initial attack of laminitis, especially if the feed or pasture intake is reduced which limits NSC 'food' for microbial growth, to help minimise the risk of sudden death of large numbers of hindgut bacteria which can cause a secondary, more damaging episode of laminitis about 7-10 days after the initial onset. A supplement of a product such as EquiSure may also be helpful to neutralise excess hindgut acidosis. **A grazing mask (founder mask) to reduce the volume of grass that can be consumed is also helpful.**

5. **Regular exercise** in 'cresty' overweight ponies, especially those which are insulin resistant, can help reduce the risk of laminitis by utilising more glucose during exercise, but do not exercise an animal with laminitis as severe internal hoof damage and further rotation of the pedal bone can occur – consult your vet or farrier for advice.

Handy Hint

Maintain short toes by ensuring the horse's/pony's hooves are trimmed every 3-4 weeks to limit the rotational force on the pedal bone resulting from devitalised laminae that are damaged by the effects of circulating toxin. Long toes increase the downward rotation of the deep flexor tendon on the pedal bone of standing animals, especially overweight horses and ponies with low heels as a result of chronic laminitis.

Management after Laminitis

Besides adopting the restricted feeding management program, horses and ponies recovering from laminitis must be provided with a diet that will not only minimise the risk of recurrence, but also allow regrowth of a sound hoof structure.

Dietary Management

Any risk of excess starch intake that could trigger a recurrence must be prevented. Chronically foundered horses and ponies are best managed by restricting grazing and feeding a low starch/NSC ration. The ration base should include low sugar (low glycaemic) feeds to minimise the risk of soluble carbohydrate overload from non-structural carbohydrates (NSCs) in Spring harvested grass hay, or even oaten chaff. Many veterinarians recommend feeding grass hay or oaten chaff or hay, as well as straw, to horses and ponies recovering from laminitis and founder. However, good quality grass hay can contain fructan sugars (Spring harvest) with NSC carbohydrates (late Spring, Summer, Autumn harvest) in a concentrated form (10% moisture) which can overload into the hindgut. All types of grass hay and clover hay (including 'sweet' oaten chaff and hay) should be soaked for 1 hour in luke-warm water to leach out soluble sugars (as explained in Points 3 and 4 above). Unfortunately, grass hays and chaff have poor quality protein which does not provide an adequate intake of amino acids (lysine, methionine) for hoof keratin regrowth after founder. **Lucerne hay has higher protein and a lower level of NSC, but in large amounts in excess of 1kg/100kg , it can overload excess sugar into the hindgut to trigger laminitis – it must be soaked as well.**

Handy Hint

Horses rely on protein uptake from feed during digestion in the small intestine and have a limited ability to utilise bacterial protein produced during hindgut digestion. Therefore, good quality protein, containing adequate methionine for hoof regeneration, should be given, such as full fat soyabean meal, canola meal or cracked lupins (1 cup/200 kg body weight) and lucerne chaff/hay (1 kg per 200kg bwt) in limited amounts.

Note:- Although clover hay contributes protein, avoid feeding large amounts as it can also contribute carbohydrate NSC sugars – lucerne has a lower carbohydrate content or is a 'low glycaemic' roughage.

Low Starch Foods

These include wheat and rice bran (has more energy but up to 20%NSCs), pollard (limited amounts of 150g/100kg bwt) and compounded feeds such as KER Equi-Jewel or Pryde's Rebuild (which provides calcium, zinc and selenium) and vegetable oil such as **Energy-Gold®** (15-30ml/100kg) as a "cool", non-starch energy source. Equestrian pellets, horse and pony cubes are usually low in soluble fermentable starches and can also be used as an energy source in a working horse. Avoid feeding extruded or micronised grains or feeds as the sugars are absorbed from the small bowel and can make a horse more excitable. Check the label for ingredients – avoid cereal grain based feeds. **Remember: Soak good quality spring hay to remove soluble sugars, see point 3 above.**

Hoof Growth Aids

Protein supplements containing methionine, as well as calcium, zinc, Vitamin A and Biotin (also known as Vitamin H) supplements are useful to promote hoof regrowth (eg a Biotin supplement combined with a well formulated trace-mineral and vitamin supplement, such as Kohnke's Own Cell-Provide® (contains calcium as well) or Cell-Vital® with additional dicalcium phosphate (20g/100kg body weight) is recommended. Dolomite is not a suitable source of calcium as it is poorly absorbed in horses.

Remember, dietary management, regular exercise and hoof trimming to maintain short toes is paramount to preventing repeat episodes of founder.