Causes of Laminitis

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Laminitis, or inflammation and fluid build-up within the hoof, is a painful and debilitating problem which can have a long term crippling result in horses, ponies and miniatures. Although there are a number of causes of laminitis, and the more severe form of internal hoof collapse as in founder, it has been estimated that 80-85% of laminitis is seasonal and related to the excess consumption of fructan and soluble sugars, as well as non-structural carbohydrates (NSCs) from good quality pasture and hay in grazing horses and ponies, especially those which are 'good doers' or 'hooverers'. Many well fed horses and ponies have a metabolic related risk of developing laminitis if they are overweight with underlying Equine Metabolic Syndrome (EMS) or Insulin Resistance (IR) as they age over 10-12 years of age or develop Cushing's Disease in old age.

The causes and complications of EMS and Cushing's Disease are discussed in Fact Sheet C3.

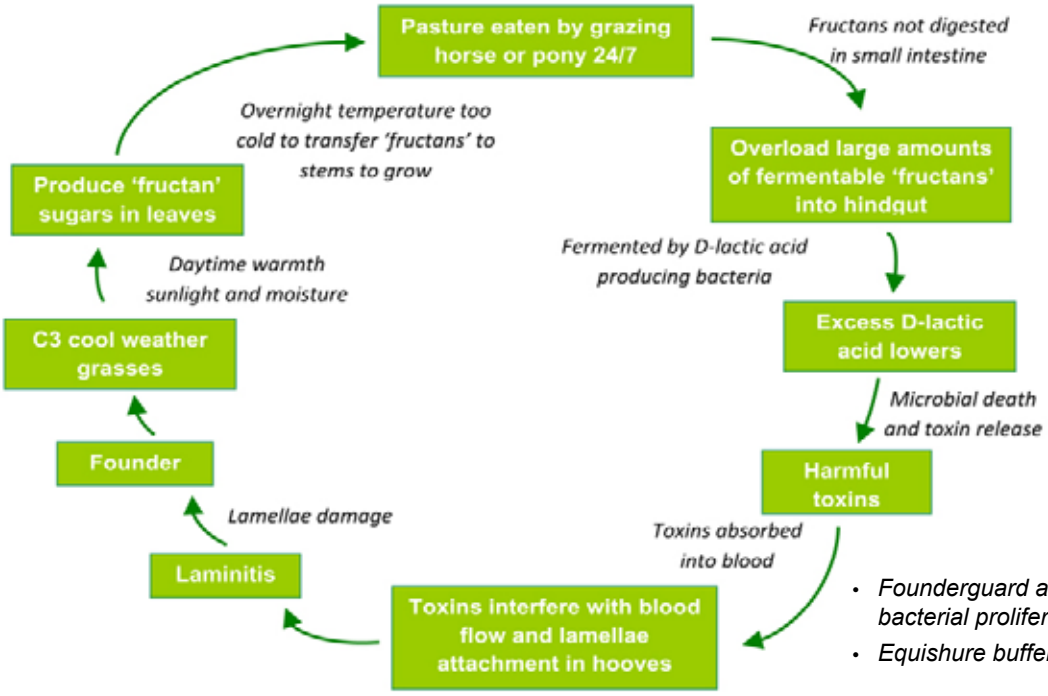
Other less common causes include severe **toxic founder** due to infection from hoof abscesses; retained membranes in a newly foaled mare or septicaemia from colic or travel sickness; **stress founder** resulting from dehydration and stress when standing for long periods during transport; **concussion founder** when worked at speed on a hard surface and **weight transfer founder** due to excessive weight bearing on a 'good' limb for more than 9-10 minutes at a time to take the weight off an adjacent, severely painful injured limb as result of a bone fracture, a severe tendon injury or a wound, such as deep wire cut from a fence.

The Most Common 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 are able to accumulate large amounts of non-structural carbohydrates (NSCs) in the form of fructans and other simple sugars. Under cold overnight and early morning conditions, these sugars are not transferred into the plant stems for growth. Some of these simple sugars in the succulent shoots and leaves are digested in the stomach and small intestine to release glucose, which then triggers an increase in the level of circulating insulin, which is already high in an animal suffering from Insulin Resistance. **In turn, the elevated insulin acts directly to trigger the onset of laminitis and devitalisation of the hoof lamellae**. Any excess sugars may also be overloaded into the hindgut, with secondary production of 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 lamellae and devitalise the basement membrane attachments. The weakened lamellae attachments can be torn apart by the continuous downward rotational 'pull' of the deep flexor tendon attached under the pedal bone, leading to founder.

Cycle of Spring Founder



- *Founderguard acts to suppress harmful bacterial proliferation.*
- *Equishure buffers excess hindgut acid.*

Late Spring and Autumn Founder

Pastures which reshoot after rain, grazing or after being slashed under warm, wet 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 trigger an insulin surge, leading to laminitis, especially in animals bordering on Insulin Resistance (IR).

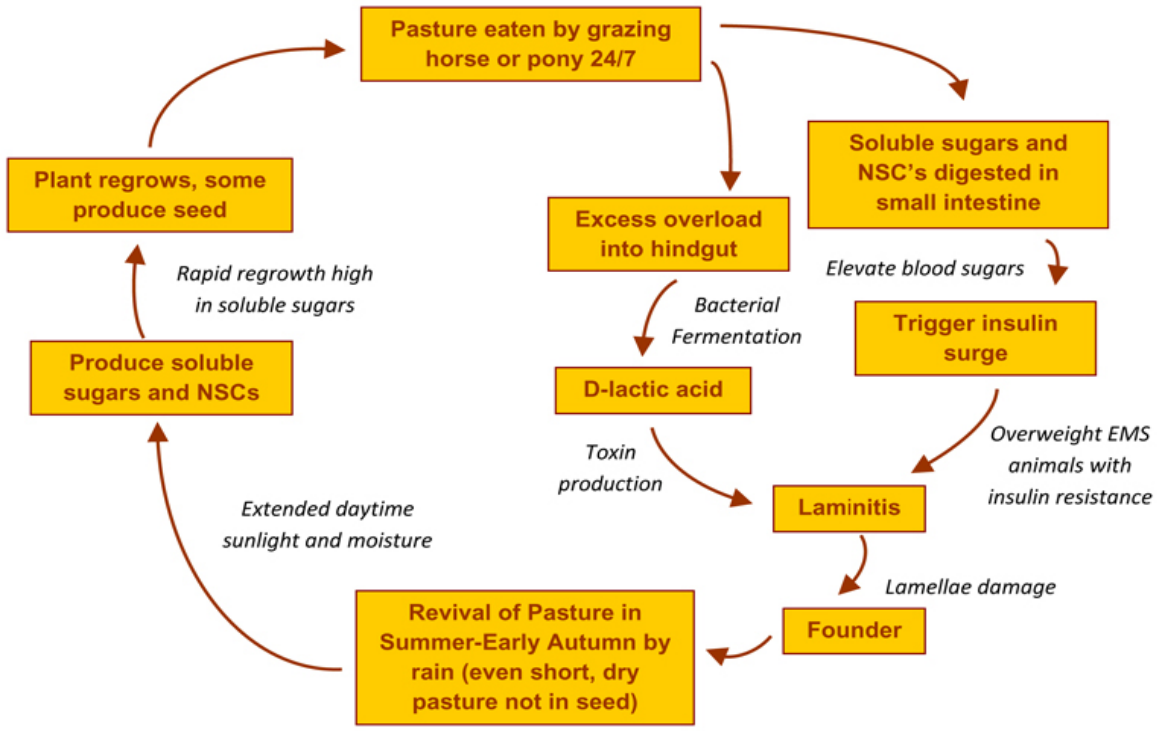
Handy Hint

A heavy frost can cause the release of sugars stored in severely 'burnt' pasture grasses in early spring, or when pastures are sprayed to control broadleaf weeds, making the grasses 'sweeter' and more palatable to grazing horses, with a risk of laminitis in EMS affected horses and ponies. Even dried grass dying off under drought conditions without regular rainfall to leach out sugars from the 'standing hay', poses a risk to over-weight and 'cresty' horses and ponies grazing the dried grass.

Handy Hint

Laminitis is most likely to occur in 'cresty', overweight horses and ponies suffering from underlying Equine Metabolic Syndrome (EMS) and pre-Cushing's Disease with a glucose intolerance and insulin resistance similar to Type II diabetes. It does not take very large amounts, even an overnight 'binge' on high "sugar" pastures, to trigger a laminitic episode in 'cresty' and overweight EMS horses and ponies. Susceptible horses and ponies with underlying EMS are on are on a virtual 'tight-rope' in balancing NSC intake from grasses during periods of lush pasture growth or when they have unrestricted access to grazing on high risk pastures. Regular daily monitoring for a 'hardening of a 'cresty' neck which heralds glucose intolerance and a surge in insulin, can indicate an impending laminitic episode. Careful grazing management during high risk periods is essential to avoid repeated episodes of laminitis.

Cycle of Summer/Autumn Founder



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