

# Grass Founder

## Laminitis (Laminar = layers, Itis = inflammation)

Laminitis is an inflammatory condition of the laminae (the structures within the hoof that connect the external hoof wall to the internal coffin bone) and is one of the most distressing conditions that can face horses and their owners. It occurs most often in the front feet although it can affect the hind feet as well. Sadly it is also common, reportedly affecting 7.4% of horses and ponies at some point in their lives.

## Founder (= Send to the bottom)

Founder is a progressive condition following acute laminitis, where the weakened basement membrane is detached within the hooves to allow the deep flexor tendon to pull (rotate) the toe of the coffin bone (sometimes known as the pedal bone or P3) downwards to separate the laminae. Without the distal phalanx properly attached to the inside of the hoof, the weight of the horse and the forces of locomotion drive the bone down into the hoof capsule, shearing and damaging arteries and veins, crushing the corium of the sole and coronet, and causing unrelenting pain and a characteristic lameness.

## Main causes of founder

- Lush pasture “Grass Founder” - Horses consume too much and their digestive system becomes shocked by the excess non-structural carbohydrates. Lush pasture is the cause of about 45% of Laminitis cases.
- Grain overload can lead to severe colic - Endotoxins and exotoxins are released and absorbed by the bloodstream which results in reduced circulation, primarily in the feet. Grain overload is the cause of over 7% of the Laminitis cases.
- Insulin resistance often caused by pasture/hay and grain overloads.
- Poor digestion - Acids and toxins are produced which end up in the blood stream damaging blood vessels.
- Hard ground “Road Founder” - Increases the concussion on the horse’s feet.
- Retained placenta by mare after foaling - Either from toxicity or bacterial infection.
- Various primary foot diseases and Infections - Produce enough toxins to damage blood vessels.
- Black Walnut Bedding - Laminitis can occur through exposure to Black Walnut (*Juglans nigra L*) shavings used as bedding in stalls. As little as 10 percent of the total shavings, by weight, may result in clinical signs of toxicity in horses. Sadly research has yet to determine if the problem is caused through ingestion or topical exposure.
- Consumption of cold water by an overheated horse
- Cushings Disease
- Obesity

## Cause of Grass Founder

Good winter and early spring rains and the onset of sunnier weather can result in a ‘flush’ of lush, rapidly growing grass pasture containing a high level of non-structural carbohydrates (starch, sugars and fructan) and protein. Under ideal moist, sunny conditions after cold nights, the rapidly growing early spring grasses can produce large amounts of fructal sugars (a non-structural carbohydrate composed of glucose and varying fructose molecules) stored in the stem. In Ohio April has higher levels (more than two times) of non-structural carbohydrates (mainly sugar and some starch) than in other months. Grass regrowth (usually in October in Ohio) does not cause high non-structural carbohydrates. Horses do not have an enzyme that can break down fructose sugars in their small intestines, so that large amounts of undigested food move into the caecum and large intestine. In the large bowel, fructans are fermented by particular gram-positive lactic acid producing bacteria that proliferate rapidly, generating large amounts of lactic acid, including non-metabolised, damaging D-lactic acid that lowers hindgut pH. The decreased in hindgut pH (acidosis) results in the death of large numbers of digestive microbes. When the fructose intake reduces, the excess bacteria run out of fructan ‘feed’ and die in large numbers to liberate damaging vascular toxins (endotoxins). The high acid concentration damages the gut wall, allowing the endotoxins to enter the blood stream.

In the horse, the vessels of the feet are particularly sensitive to these toxins, which cause profound vasoconstriction. Clinically this condition is referred to as laminitis, or inflammation of the sensitive lamina of the foot.

These changes occur 24-48 hours prior to clinical signs of laminitis.

These toxins act to devitalise the basement membrane which loads the laminae within the hooves, producing chemical damage to the bonding sites. They also act to reduce blood circulation to the laminae by opening ‘shunts’ to circulate blood away from the laminae and ‘starve’ them of nourishing blood.

### Which pasture grasses are safer?

Research suggests that safer grasses are those with lower levels of non-structural carbohydrates. Warm season grasses like prairie grasses, native grasses and Bermuda grass generally have lower levels of non-structural carbohydrates while cool season grasses like timothy, orchard grass, brome, fescue and clover have higher levels.

Higher levels of non-structural carbohydrates are found with higher temperatures, higher radiation (photosynthesis) and are lower with increased humidity.

Cut hay is usually higher in non-structural carbohydrates if it is dried fast in sunny conditions after cutting and lower when it is slow dried and humid after cutting.

### Which horses are prone to grass founder?

If the horse is in working condition it is very unlikely to founder on new grass.

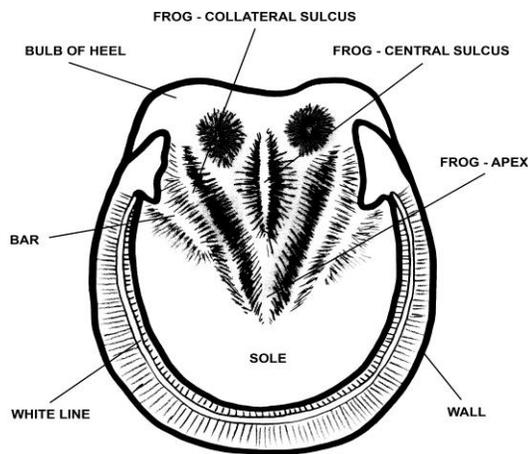
The overweight horse, on the other hand, are particularly prone to “laminitis triggers” and can founder on spring grass, good quality hay or summer grass that has gone to seed. The heavy horse has a threshold where it is safe. This is when its nutrient intake matches the energy needs of its body.

Horses with a previous history of laminitis, and horses with Cushing's disease are predisposed to “grass founder.”

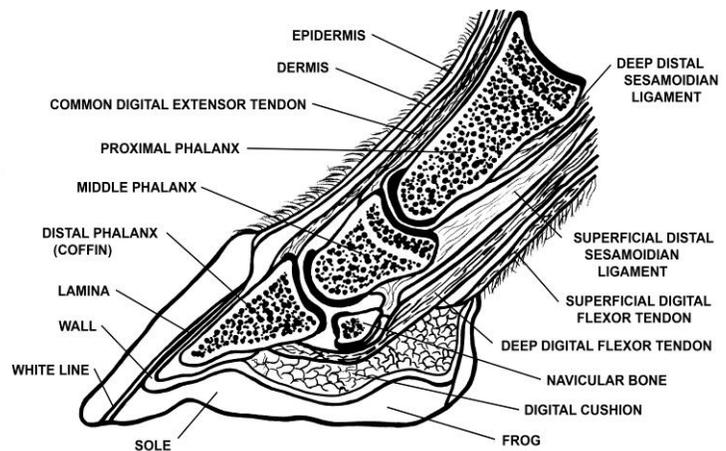
Certain breeds like Morgan, Arabian and Warmbloods seem predisposed.

Also the risk is increased with the condition called Equine Metabolic Syndrome. EMS is an endocrine and metabolic disorder, where Insulin Resistance (IR) is the primary problem encountered. Affected animals will either suffer from generalized obesity and have an overall overweight appearance, or look more normal in appearance but have enlarged fat deposits in the neck and tailhead regions. The presence of enlarged fat deposits in these locations is referred to as regional adiposity and the thickened neck region is often called a “cresty neck.”

### Hoof Physiology



HOOF - from the Bottom



FRONT FOOT - Cross Section

### Signs of laminitis

If just the two front feet are affected, the horse will stand in the "founder stance" with his hind legs well up under the body carrying as much weight as possible, and the front legs placed forward with the weight on the heel. He will be reluctant to walk and will turn by leaning back and pivoting around on the rear legs.

If all four feet are affected, the horse will lie down for extended periods and may refuse to get up. If forced to stand, he will pull his hind feet and fore feet in toward each other under the centre of his body.

Other symptoms include heavy breathing and glazed eyes due to pain. The feet will feel hot and the digital artery, located over the fetlock joint, will have a pounding pulse.



#### Mild laminitis:

- Short stilted gait with a “heel first” footfall
- Shifting of weight from one leg to another
- Repeated lifting of alternate feet
- Gait worse on hard ground
- Reluctance to stand on a hard surface
- Often worse when turned sharply
- Heat in feet, especially near the coronary band
- Increased digital pulses

#### Severe laminitis:

- Acute onset lameness affecting one or more feet, usually both front feet
- Reluctance to move
- May be impossible to lift feet
- Recumbency
- Increased digital pulses
- Heat in feet, especially near the coronary band

Moderate laminitis lies somewhere in between with varying degrees of the above signs/symptoms

Each attack of acute laminitis can leave a ring formation on the hoof. A horse suffering from chronic founder will have multiple rings on his hooves. He might also have seedy toe, a separation of the hoof wall from the sensitive laminae in the toe area. If left untrimmed, the hoof wall also overgrows to form a "slipper foot".

Due to the speed with which laminitis can progress and the severe sequelae that can result many regard laminitis as a medical emergency. As an owner the ability to recognise the signs of laminitis will enable earlier intervention and often greatly improve the eventual outcome.

#### Prevention of grass founder

Start the eating of spring grass slowly. Let horses graze for 30 minutes a day, and then increase the time allotted over the course of a few weeks, as long as they handle the new diet well.

Feed low non-structural carbohydrate grain. Grain can contain from 10 to 34% non-structural carbohydrate. Oats, corn and barley are usually high in these carbohydrates.

Use a grazing muzzle while the horse or pony is in the pasture. The muzzle only allows the eating of the top of the grass (the best part), reduces the amount eaten, while providing the same opportunity for exercise.

#### Treatment Hints

The sooner laminitis or founder signs are detected in a horse, the more likely the horse can make a full recovery without long term complications. Call your vet and follow his/her instructions.

If you have any suspicion of laminitis then the horse or pony should be ideally be placed on a deep shavings bed and given only hay and water whilst you seek veterinary attention. However if the horse or pony is severely affected whilst out at grass it may be better to leave the horse where it is until your vet arrives but prevent it from grazing. Spreading a bale of shavings around the horse and getting the horse to stand on them may also offer some relief.

Restricting movement by confining to a small yard, and standing the horse on wet sand to maintain 'cool' feet can help control inflammation and provide support to help limit downward rotation of the pedal bone.

Pack the hooves in ice at the earliest stage of laminitis and founder. Repeat ice packing every 15-20 minutes for 24-36 hours or application of 'icing boots' can significantly reduce the immediate damage to the laminae. Research suggests that horses, unlike humans, do not regard extremely cold feet as uncomfortable and can tolerate having their feet in iced water for 48 hours without effect.

The distal phalanx (coffin) bone is connected by tendons to the rest of the leg. These tendons run from that bone up the back of the leg to various muscles. These same tendons are the ones flexing the leg when the horse walks or runs so we can see how strong they are. Each time the foot makes contact with the ground the tendons are drawn tight. Normally this gives spring to the step as the distal phalanx bone is firmly attached to the hoof wall. But with inflammation of the foot, the tendons actually add to the discomfort by pulling the distal phalanx bone away from the hoof. The longer the toe of the hoof, the greater the break over a period of time, which keeps tension on the distal phalanx bone longer. A shorter toe allows the foot to break over more quickly and before the tendons are drawn tight.

As soon as the horse has been treated for the acute phase of founder, trimming the toe very short will allow more comfortable walking. Trim every 3-4 weeks and maintain heel support.

In more severe cases, shoeing with a flat shoe and preferably one with a worn toe, will protect the foot from contact with the ground. Additional doses of pain reliever or local nerve blocks may be necessary before the farrier can work on one foot while the horse supports all its weight on the other.

Give the horse a well formulated calcium, trace mineral and vitamin supplement with organic selenium and chromium to help laminae bonding and limit insulin resistance. During recovery, provide a daily source of good quality protein, such as lupins or soybean meal (30g/kg of food) to the feed to help laminae regeneration.

Reduce non-structural carbohydrates in hay by soaking in hot water for 30 minutes or in cold water for 60 minutes. Pour water out after soaking.

For further in-depth reading search on:

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Article composed from information found on the internet.

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