

Laminitis and Founder

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Inside the hooves is a bone called the pedal bone which is 'stuck' to the inside of the hoof. The bond between the hoof wall and the pedal bone is formed by the laminae.

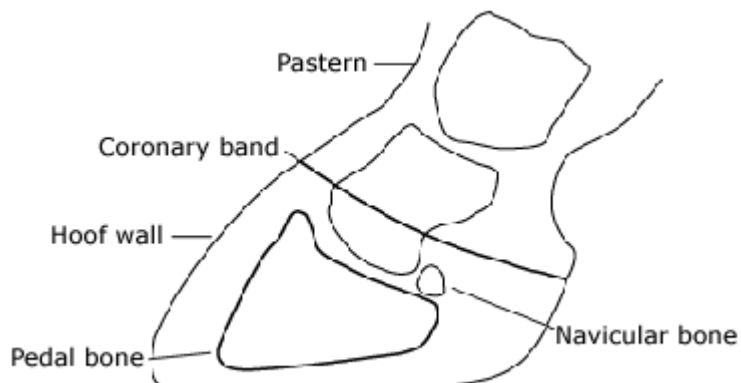
Laminitis: is an inflammation of the laminae in the hooves.

Founder: describes a foot in which the pedal bone has moved.

Laminae are folds of tissue on both the pedal bone and the inside of the hoof wall that nestle into each other like 2 sheets of corrugated iron. This bond supports the weight of the horse.

The diagram at the right shows the normal hoof anatomy.

NORMAL HOOF ANATOMY



When the laminae become inflamed and weakened, they cannot maintain their bond and the pedal bone separates from the hoof wall. The weight of the horse loaded on the pedal bone places enormous stress on the weakened lamina. The attachments between the hoof wall and the pedal bone tear and free from its anchoring, the pedal bone moves downwards.

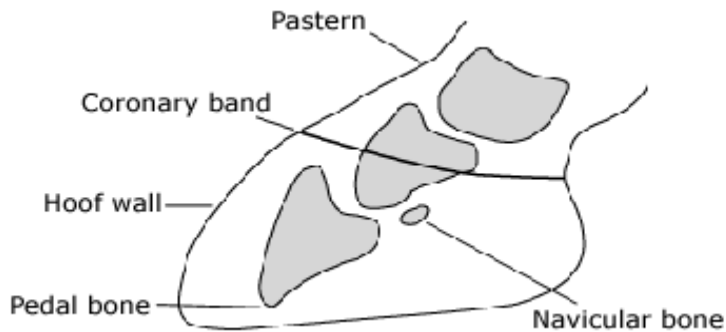
What causes laminitis? The following have been established: high grain or starch diets, large drinks of cold water, concussion from working on hard roads, retained placenta after foaling, being overweight, sudden access to lush pasture, unknown. Most of these conditions cause inflammation of the affected tissues. Dietary factors cause a build up of acid in the caecum (part of the large intestine). This kills off beneficial bacteria and damages the wall of the caecum. The damaged tissue suck glucose out of the blood as it attempts to repair itself. Blood glucose levels in the feet fall and the tissues of the hoof lose their energy supply and become stressed. The bond between the pedal bone and the hoof wall weakens as the tissues lose vitality. Laminitis can occur within hours to days of any of the above insults.

When laminitis is mild, there may only be slight X-ray changes and no lameness. Often there is a history of poor performance. This is because the laminitic changes are not severe enough to cause pain at the trot. However, at the gallop when the leg is loaded with over 4500kg, pain and discomfort occur and the horse reduces speed.

Severe laminitis occurs when the pedal bone completely detaches from the inside of the hoof wall. When this happens the pedal bone separates from the hoof capsule and penetrates through the bottom of the foot -- the sole. The coronary band may haemorrhage. This is due to tearing of the laminae as the pedal bone moves downwards. Such horses experience extreme pain and irreversible damage. Little can be done to help them.

Sinking or rotating: If the pedal bone separates uniformly around the hoof wall, it is likely that the bone will move vertically downwards. This is termed '**sinking**'.

If the pedal bone only separates at the front of the hoof the bone may rotate. The deep flexor tendon anchors the back of the bone, so the front tip of the bone rotates downwards. This is '**rotation**'. The diagram shows the changes that occur with rotation and sinking.



2. SINKING: The pedal bone separates completely and the whole bone moves downwards. The hoof must be reshaped by growing the toe and the heel to lift the pedal bone back off the ground.

1. ROTATION: The laminae at the toe have torn releasing the front of the bone. The tendon at the back of the bone has anchored to the bone. When this happens, the pedal bone tilts, tips or rotates and points downwards. The hoof must be radically reshaped. The heels and toe must be trimmed regularly for up to 12 months so the pedal bone is gradually repositioned to be parallel to the ground again.

X-rays are required 4 to 6 weeks after an episode of laminitis, to determine whether the pedal bone has rotated or sunk. The farriery required for each condition is different.

How to reduce the risk of laminitis: Do not allow horses and especially ponies, to become overweight; avoid working at high speed on hard surfaces; do not allow free access to water immediately after exercise; seek veterinary attention if mares do not pass the placenta; do not allow access to pasture at night when plant sugar levels are highest; do not feed raw or poorly digested feeds. As shown in the figure below, starch digestion must occur in the small intestine to prevent a build up of acid in the caecum. Dietary Omega 3 supplements protect against laminitis in horses*.

When the bacteria in the caecum die, they release chemicals which damage the gut wall. Boiling, grinding, cracking and crushing can damage nutrients and do little to improve digestibility. Steam extrusion combines and advances these older methods. By untangling complex proteins and starches, steam extrusion enables the horse's natural digestive enzymes can work up to 100 times faster. Digestion in the small intestine increases to over 90%. In this way, steam extrusion shifts the site of digestion *back to the small intestine*, where nature intended it to be - without additives, enzymes and antibiotics. This reduces risk of laminitis, colic, diarrhoea and improves nutrient availability.

Care of the horse with laminitis: Both veterinary and farriery monitoring are required. Nutrition must be high quality to provide proteins, vitamins and minerals necessary for the laminae to heal. Energy should be restricted and protein must be well digested in the small intestine to provide essential amino acids. Exercise must be restricted to prevent overloading and tearing of the remaining laminae.

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