

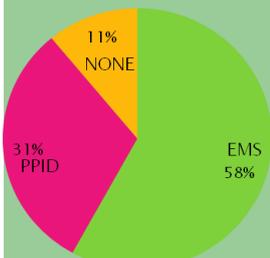


What is it? A horse has laminitis when the connective tissue (the laminae) that suspend the pedal bone to the inside of the hoof wall fails. Without the pedal bone properly attached to the inside of the hoof, the forces associated with the weight and movement of the horse will drive the bone down within the hoof, crushing important blood vessels and causing constant pain and a typical shuffling, potterly gait.

When a horse first starts to show signs of laminitis, the anatomy of the hoof wall is already being destroyed. Any activity that places stress on the feet causes further damage so it is important that we start to treat cases of laminitis as soon as possible.

How is it caused? There are two main types of cause. The vast majority involve glucose (and are normally associated with an endocrine condition such as Equine Cushing's disease). Others involve enzymes (and are associated with toxins released when the horse over-eats or suffers from a condition such as metritis):

- Glucose:** Hoof tissue relies on glucose for maintaining the adhesion of the laminae. When the hoof is starved of glucose the laminae start to separate. The hoof may be starved of glucose in times of stress, when cortisol (the body's internal steroid) sends glucose to maintain the vital internal organs (heart, lungs, brain etc.) at the expense of peripheral tissues. In the majority of cases however, laminitis is caused by endocrine conditions such as Equine Cushing's Disease (PPID) or Equine Metabolic Syndrome (EMS) affecting glucose uptake in the feet. Equine Cushing's disease (PPID) is caused by a growth on the pituitary gland, PPID leads to excessive production of adrenocorticotropic hormone (ACTH) producing increased cortisol release and a hormone imbalance that disturbs the glucose uptake within the connective tissue of the foot. Equine Metabolic Syndrome (EMS) involves a variety of processes but the most important here is insulin resistance. Insulin removes glucose from the blood stream and into cells (such as the cells of the laminae) but here we have a widespread resistance to insulin so although we have high blood insulin levels it is ineffective and so despite the high blood glucose level, the cells are being starved of glucose. The injection of steroids can also potentially (but very rarely) cause laminitis by the same processes.



Karikoski et al 2011

The % of laminitis cases that have an endocrine cause

- Enzymes:** The connective tissue that attaches the pedal bone to the hoof wall is constantly being regenerated by enzymes called MMP-2 & MMP-9, but in the early stages of laminitis MMP-2 & MMP-9 are activated out of control and destroy the connective tissue. This release and activation of MMP can be caused by toxins released by certain bacteria (s.bovis) which activate MMP and cause separation of the laminae. This bacteria is responsible for rapid fermentation of carbohydrate in the hindgut. When a horse eats a huge amount of carbohydrate (i.e. if he gets into the feed room!) then this can lead to a lot of fermentation and the bacteria and toxins can leak across the gut wall and into the blood stream causing problems throughout the body and activating MMP in the hoof.

How is it diagnosed? Laminitis generally presents as an acute onset of lameness involving both front feet. However it can affect the hindfeet and can affect just one foot.

- The horse may be extremely reluctant to move, and will often walk landing on the heels first with a short, potterly gait.
- Lameness is usually far worse when the horse is made to turn and worse on harder ground.
- usually a digital pulse can be easily felt, and sometimes the affected feet may be hot.
- Pressure with hoof testers applied to the sole may sometimes cause pain, and a depression around the coronet band (associated with sinking of the pedal bone) may be felt.



Checking digital pulses

Laminitis continued...

These signs are normally enough to diagnose laminitis very quickly. In more subtle cases, nerve blocks (to establish that pain is coming from the feet) can be useful.



In all cases, taking **x-ray** pictures of the feet is **incredibly useful**. They allow us to determine whether the condition is **acute** (new) or an exacerbation of a more **chronic** (ongoing) problem.

The pictures can show **rotation or sinking of the pedal bone** (which occurs as the lamellar bonds are broken and the pedal bone loses its anchoring to the hoof wall). They also show us areas of overgrowth in the hoof wall and how thick the sole is. They are therefore **very useful** in helping us know **how severe** the condition is and **corrective farriery** is far more **effective** if the farrier is able to see these images and know how best

to trim to support the affected pedal bone.



Also, because laminitis frequently develops **secondarily** to a **primary disease** process it is really useful to evaluate the whole horse and take blood samples to diagnose **PPID** or **EMS**.

How is it treated? As stated, cases of laminitis need veterinary treatment as soon as possible. Non Steroidal Anti-Inflammatory Drugs (**NSAIDs**) are required to **reduce inflammation** and **foot pain** and these drugs are the mainstay of the medical management of laminitis. It is also vitally important that we **prevent** any **further damage**. The horse should be immediately **box-rested** so no excessive exercise can occur and the box needs to have a deep, comfortable bed (ideally shavings on rubber matting) to **cushion the feet**. Any underlying disease or carbohydrate overload should be addressed.

The feet should then be **trimmed and shod** by a farrier **trained in remedial work** as soon as the horse is comfortable enough for this. Follow-up remedial farriery may well be necessary for a number of weeks.



The **majority** of laminitis cases have a **primary endocrine disease** which causes the condition so it is imperative that this is **diagnosed** and **treated** correctly. **PPID** can be effectively treated with daily administration of the oral drug Pergolide mesylate (sold as 'Prascend'). Whilst **EMS** can often be **corrected by management** changes to reduce the weight and fat distribution of the horse.



Some horses that show the **clinical signs** of **acute** laminitis **recover** completely when **treated promptly** with a combination of medical and mechanical support. However horses **recovering** from even the mildest cases should be **observed very closely** and only returned to normal turn-out and ridden work when medication has been discontinued and we are confident that there are **no clinical signs of laminitis**. Laminitis is a serious condition and unfortunately there are a significant number of more severe cases where despite numerous months of treatment we do not see the desired improvement and euthanasia is necessary on humane grounds.