



ULTZ

staatl. anerkannt
methodenoffen

Distance Education Course Hoof Care Specialist (bmt) (bio-mechanically trained)



**Lesson 10: Sick and injured animals
and their treatment and care**

Mechanical overload laminitis

This type of laminitis is caused by acute overloading of the corium. It occurs most often when horses do not load one leg at all, e.g., due to strong pain from an orthopaedic illness (such as a fracture). The other leg then bears all the weight and is over loaded. The constant pressure on the loaded leg can compress the blood vessels and cause reduced blood flow in the hoof. This is also called **supporting limb laminitis**.

In the past, war horses often became laminitic from long, gruelling marches on hard ground.

Symptoms of laminitis

Acute laminitis:

Grade 1: When resting, the horse frequently shifts its weight from one hoof to the other. Not lame in the walk but shows short, stiff steps in the trot.

Grade 2: Horse walks willingly but is very stiff. Horse can pick up one hoof without difficulty.

Grade 3: Horse shows resistance to being walked and shows strong resistance when trying to lift one foot.

Grade 4: The horse refuses to move. It will only walk when forced. May stop eating due to pain. Laminitic stance to unload front feet.

Extreme heel-first landing is very typical for laminitic horses as they are trying to avoid loading the sole and toe. To do so, the horse will hold its legs far forward, while also moving the back legs under the belly to take as much load on the hind legs as possible.

The extreme sensitivity to pressure of the sole is due to the coffin bone and disruption of circulation in the hoof. It is strongest towards the front of the sole immediately in front of the tip of the coffin bone.

Horses often show extreme pain when turning.

Symptoms

A bounding digital pulse is typical. High grade laminitis can also cause colic-like pain symptoms. The horse may sweat, shiver and not be able to get up.



Testing for digital pulse

Usually, it is the front legs that are affected by laminitis, but all 4 can be affected as well. A single hoof generally only gets laminitis from over loading (supporting limb laminitis).

It is important to obtain X-rays to determine the grade of laminitis.

Chronic laminitis

Chronic laminitis is slightly more difficult to diagnose. Usually, signs only include a stiff gait, increased heel-first landings, and a foundered hoof shape with diverging growth rings.



Laminitic/founder hoof shape

Diagnosis

The typically clear symptoms make it easy to diagnose laminitis, but it is always prudent to have X-rays taken to determine the grade and to decide on how to trim or shoe the horse.

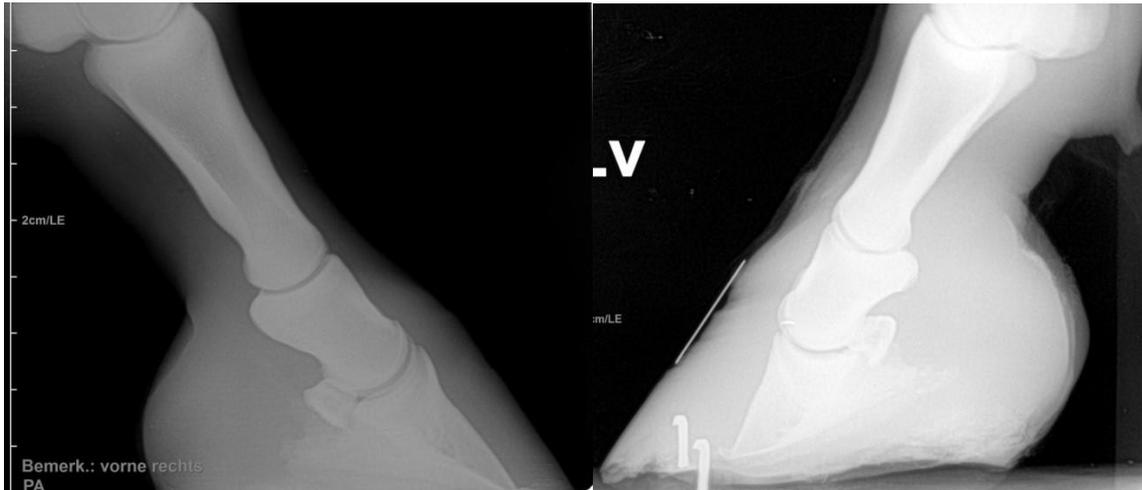
Nowadays, digital X-ray machines make it easy and quick for vets to measure distances and angles on site.

Hence, the vet can give the trimmer or farrier exact instructions as to where to remove horn and how much of it.

What points are important when diagnosing using X-rays?

Has the coffin bone rotated?

The dorsal line of the coffin bone should be parallel to the dorsal hoof wall.



Parallel and non-parallel coffin bone/hoof wall

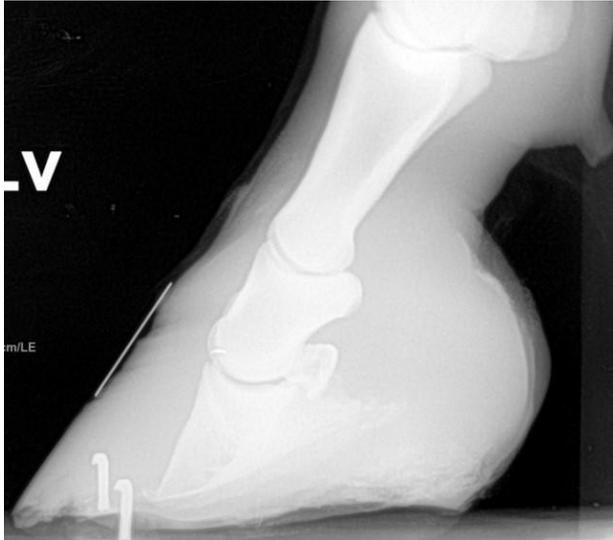
Is it a “sinker”?

Without rotation, a sunken coffin bone is not always easy to spot.

For diagnosis, it is important to measure the “sinking distance” – the distance from the hairline (using something metallic to mark it on the X-ray) to the highest point of the coffin bone (technically called “coronary band:extensor process distance” or CE).

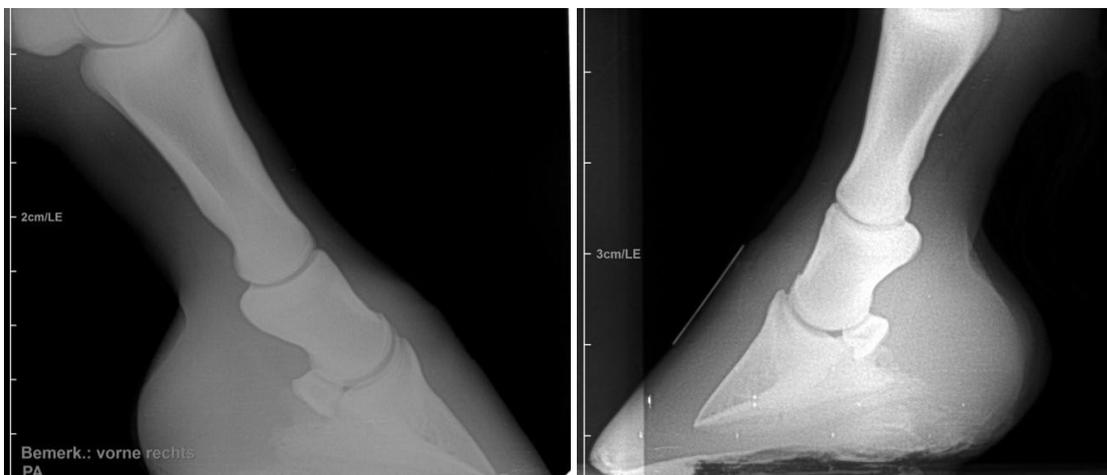
This distance should not be more than 1.5 cm in a healthy horse.





What is the distance between the coffin bone and the wall?

- On an X-ray, the distance between the coffin bone and the wall should not be more than 2 cm for a larger horse
- If the distance is larger, then this indicates a breakdown of the coffin bone-wall connection

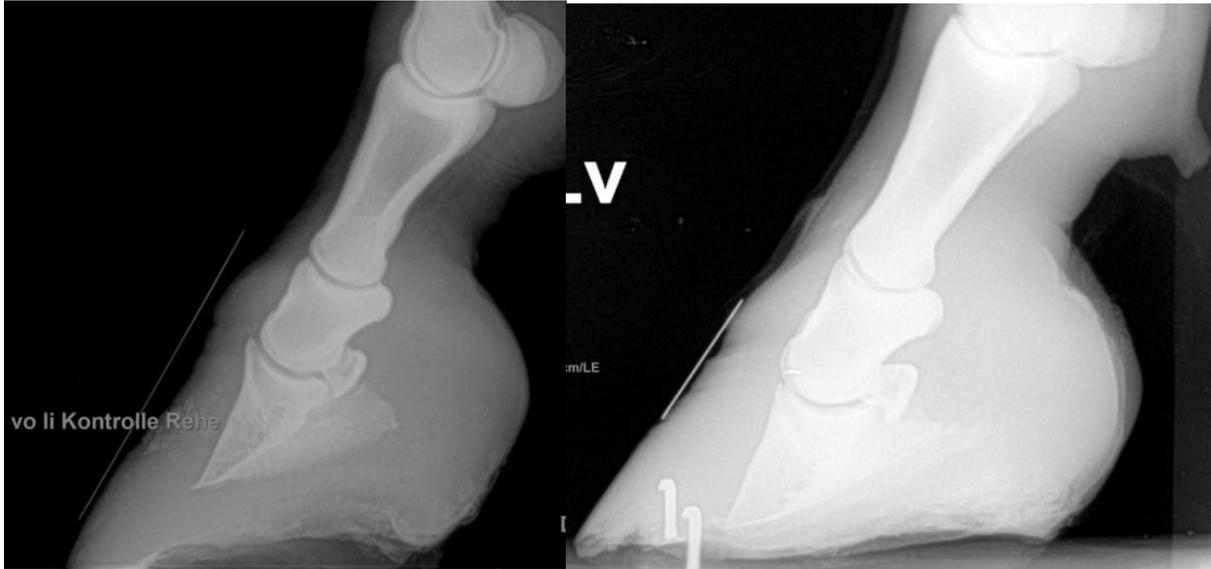


Left image: Distance between lines is less than 2 cm

Right image: Distance between lines is more than 2 cm

How thick is the sole?

- It is important to know the thickness of the sole in a horse with strong rotation to determine the risk of sole perforation
- For trimming the hoof, it is clearly important to know how much sole can be removed



Left image: Sufficient sole depth despite rotation

Right image: Very thin sole, sole perforation imminent

The worst scenario

Coffin bone perforates the sole



Treatment

First aid for acute laminitis

- Cooling bandages from the hoof all the way to the knee
- Padding using bandages or boots to relieve pressure on the sole, possibly with further padding under the heels to reduce the pull of the DDFT
- Shoes need to be removed, or at least front-nails removed

Medication

- **Anti-inflammatories** with pain relief should be prescribed by the vet (Flunixin meglumine, Phenylbutazone, Meloxicam). On the internet, theories abound that say that pain relief will make the situation worse as the horse will load the hoof too much.
- From a vet perspective, however, anti-inflammatories are essential to stop the inflammation in the hoof!!
- The horse should be locked up in a stall with very soft bedding!
- **Blood thinners** can be given to improve circulation in the hoof initially, a vet might prescribe Heparin, some people use Gingko supplements as alternative medicine.

Further treatments

In the initial phases, absolute stall-rest is essential, in a stall with very soft bedding (a layer of sand with soft bedding on top is very good). Walking on hard surfaces is very painful and can make the situation worse, as any shock/vibration can rotate and sink the already loosened coffin bone even further!

Once the extremely painful acute phase has passed and the horse can move mostly pain-free, the owner, vet, and farrier/trimmer can start bringing the horse **slowly** back to normal loading. This can be tricky as the horse often seems to move normally and wants to move. However, it will take months before the distal suspensory apparatus has regained enough stability and strength for normal loading!

As the new wall **grows down**, strong interlocking laminae develop again from the top to hold the coffin bone and hoof wall tightly together. However, only when the hoof has completely regrown in its entirety has it reached its original strength. This means that it will take at least 6 months before half the hoof is relatively stable.

Hence, until then, everything needs to be done to avoid overloading and a new laminitic episode.

The risk of new laminitic episodes is especially high in “**sinkers**”:

As the bone descends into the hoof capsule, the coronary band is pulled inwards and the blood vessels in the horn growth area become compressed. This leads to inferior horn quality and scar tissue, which means that the horn wall/coffin bone stability and interlocking will never be as it was before the disease.

“Sinker” horses often show a stretched whiteline and crumbly horn.

The use of glue-shoes, casts or therapeutic shoes is used to support the hoof by making sure the back of the hoof and heels bear most of the weight. At the same time, the tip of the coffin bone and the sole need to be relieved of any loading. Increasing heel elevation through wedging also reduces the pull from the DDFT, which, through its pull, can increase or create rotation.

Wedging the heels reduces the risk of further sinking and it also reduces pain from the pull on the coffin bone, which is very painful for the horse!



The pull of the DDFT is reduced by wedging the heels



When shoeing, the shortened toe should be suspended over the set-back shoe so that it bears no weight. The heels need to be elevated, which is usually done using silicone pads or similar. The shoe placement at the toe should align with the tip of the coffin bone. The area in front of the tip should be suspended.

Important when shoeing a laminitic hoof

- A frequent mistake when shoeing a laminitic hoof is that trimmers and farriers tend to **not correct enough** for fear of causing a new laminitic episode
- **Extreme care needs to be taken when trimming the sole (sensitive to pressure; use hoof testers)**, but apart from that, trimming the rest of the hoof should be fairly normal
- **Very telling** is a sinking of the sole in the front of the hoof, with a stepped transition toward the back of the hoof, which can generally indicate sinking/rotation of the coffin bone

- Many farriers now insist on X-rays to determine exactly how much sole depth is available
- It is very important to shorten the toe enough to create an easy breakover (such as a toe rocker)
- Overall, the hoof should show positive wall levels (+ levels) at the sides, and the heels should be bevelled (heel bevel) to allow for soft landing
- In horses with rotation, the heels should be shortened and then elevated through wedges etc.

Features that indicate laminitis:



- excessive toe length
- Wall ridges
- Stretched whiteline with presence of blood (sometimes look like tiny drops)
- Bruised sole
- Scarred horn (whitish and crumbly) around the coronet area
- Thickened coronet area – (sinking/ rotation)

Case study: toe not shortened enough



First laminitic episode: Sinking and increased distance between wall and coffin bone. Hoof shape is ok.



Repeated X-rays 1 year later – note the deformed hoof due to fear of trimming the hoof properly!



Second laminitic episode due to overloading (horse was chased on gravelly surface while in a herd). Note good hoof trimming (after change of farrier)

Why should the farrier trim the heel?

This topic often leads to arguments between the vet and the farrier as farriers often do not understand why the heel should be shortened and then artificially elevated again. Why not leave it as it is?

This is easy to understand when looking at the biomechanical processes in the hoof:

Elevating the heels reduces the pull of the DDFT on the coffin bone. This reduces the risk of further sinking as well as the pain levels.

With expert trimming and the use of X-rays to determine distances/angles, it is possible to restore parallelism between the hoof wall and coffin bone in a horse with rotation. Since it is not possible to “push the bone back” to where it should be, the hoof capsule needs to be trimmed in a way that all distances to the bone match again.

Once the horn grows back healthily, it can be reshaped to what it was before laminitis, mechanically speaking.

To do so, the hoof wall at the toe needs to be rasped so that it is once again parallel to the coffin bone.

Most farriers do this but forget that in the heel area, the distal coffin bone, sole and heels also need to be made parallel!!



Therefore, the heel needs to be shortened, but to avoid increased pull of the DDFT, the heel needs to be artificially elevated at the same time.

Shortening of the heels only makes sense, however, if there is an actual rotation of the coffin bone. This shows clearly why X-rays should be standard procedure for diagnosing laminitis!



Wrong way of shoeing a laminitic hoof: Heels are not shortened, wedge-shoes (far too heavy!), horse has developed extremely contracted heels, which led to secondary tendon damage as normal breakover was no longer possible.

Trimming the laminitic hoof

When elevating the heel, light and flexible materials should be used. Silicon or special pads have been used most successfully.

Special glue-shoes are also available, such as Dallmer® shoes. Within the first 6 months after a laminitic episode, the heel height can be reduced little by little with each trim until it is no longer needed.

However, experience has shown that most laminitic horses need some sort of shoeing or hoof protection, at least temporarily.

Many can be carefully taken back to barefoot after some time.

A careful movement/exercise program is at least as important as mechanical support using casting or shoes!

Movement for laminitic horses

Complete box rest is generally necessary for the acute phase (2 to 3 weeks). The next step is to introduce slowly-increasing movement in the walk.

Once the horse is no longer lame, it has been shod, casted or booted, and the vet gives the green light, the horse can be exercised slowly and carefully in the walk on soft ground.

Generally, this starts with leading for a few minutes and increases to 30 minutes.

The vet should be consulted before the horse is allowed to trot, especially in severe cases.

Long phases of rest are essential! The stability of the suspensory apparatus (corium) is not restored yet and any overloading can lead to a new laminitic episode.

Although many laminitis cases can be saved and even ridden again if diagnosed and treated early, it remains a potentially life-threatening disease and needs to be taken seriously!

Feeding the laminitic horse

A horse with acute laminitis should have all hard feed stopped. Usually, hay and straw are enough to fulfill a horse's or pony's energy and protein requirements, especially with little or no movement/work.

As most laminitic horses are overweight, they need to lose weight. Most important: be patient! Horses with EMS lose weight very slowly.

Even when input is reduced, the metabolism still stores all available calories as fatty tissue.

The basis of feeding is a high-fibre, low calory diet. Therefore, grain or pellet/muesli feeds must be cut out. There are grain- and molasses/sugar-free feeds for laminitic horses that are too thin. For these horses, linseed oil and rice bran can be fed.

Feeds that are “not allowed”

- Hard/high energy feeds (oats, barley, corn, pellets)
- Any feeds with added molasses
- Molasses
- High-fat feeds (for EMS horses)
- Bread, bananas, commercial treats

Feeds that are “allowed”

- Hay
- Straw (be careful to avoid constipation during stall rest)
- Vitamin/mineral supplements (without sugar or starch!)
- Special low-energy/low-sugar feeds
- Small amounts of carrots

What about fructans (oligofructose)?

In the past, people thought laminitis was caused by proteins. Today it is clear that the problem stems from carbohydrates. Fructan is a type of long-chained sugar that is produced by plants and used as short-term energy storage.

Up to 90% of a plant's energy can be stored as fructan, especially in the stem. It is stored as an energy reserve and used during growth.

Contrary to what some people think, grass that is growing strongly is not such a problem. However, grass that produces a lot of energy through photosynthesis but does not use it for growth and so stores it is the problem. Photosynthesis occurs during sunshine, growth occurs during warm, moist times.

Therefore, we can infer:

- Fructan levels are high when a lot of sunshine leads to the production of a lot of energy, but cold temperatures mean very little growth and hence more storage and less use of fructans
- The range of fluctuations in the levels of fructans can be extreme
- For example, during cool weather (around 8 °C), grasses contain up to 200 times more fructan than during warmer weather (around 20 °C)!

- When overcast, less photosynthesis occurs and hence less fructan is produced

This means: Times of risk for laminitis-prone horses are in spring and autumn when cold night-time temperatures mean low growth and fructan use, but warm sunny days mean high levels of photosynthesis and hence fructan production.

Simplified, this means:

Weather	Plant growth and energy-storage	Risk level
Cold weather or frost with a lot of sunshine	Very high levels of energy production and fructan storage as very low growth	Very high risk of laminitis
Cold weather, frost at night	No growth but high levels of fructan storage	High risk of laminitis
Warm weather, enough moisture	Energy production but also growth and hence use/ breakdown of fructans	Medium risk of laminitis
Warm weather, overcast	Low levels of energy production but growth	Low risk of laminitis
High temperature and sunshine	Plant growth (balanced energy production and fructan use)	Low risk of laminitis

General feeding rules

- Avoid horses becoming overweight, be especially careful in high risk horses (Cushing, metabolic syndrome, at-risk breeds such as Icelandic or Shetland ponies)
- Avoid any sudden change in diet (to avoid overwhelming the hind gut flora; see above)

If necessary, avoid or restrict access to grass:

- During short, strong changes in weather/climate
- On over-grazed paddocks or those with very short grass
- When grasses start to flower
- Night-time frost

- Hay also contains fructans
- It is thought that fructan levels fluctuate depending on when during the day it is mowed
- Fructans are water soluble, which means soaking hay for an hour can decrease fructan levels immensely
- Hence, it makes sense to soak hay for laminitic horses