

Laminitis

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What is laminitis?

Laminitis is a disease that affects the laminae of the horses hoof. It is believed to be a metabolic disease in which overweight, cresty necked horses are most susceptible. Laminitis can also be associated with various forms of stress. The disease can be acute or chronic. 'Laminitis' simply means inflammation of the laminae.(1)

In the past it was thought to be a circulatory problem with inflammation, swelling and a lack of circulation within the sensitive laminae, and the bypass of the laminae by arterial blood, being the primary problems. The resulting reduced blood flow was thought to starve the laminae and cause their destruction, and although this has been proven to happen, along with pain caused by inflammation and swelling of soft tissue trapped between the coffin bone and hoof wall, it appears that this happens in response to the damage of the laminae rather than being the cause(2). Research has shown that 'normal' circulation is necessary to deliver laminitis triggers to the hoof. Experimental restriction of blood flow to one hoof will keep it from developing laminitis while the other 3 hooves are affected (after carbohydrate overload)(3).

When the horse is subjected to the laminitic trigger, such as poor diet, the laminae rip apart at the coronary band causing the hoof wall to lose its attachment to the coffin bone. This allows the wall to spring away from the coffin bone, not the coffin bone to rotate as previously thought. Sudden 'rotation' of the coffin bone is rare; usually it has occurred over a period of time before it is recognised. When a lamella wedge is seen it has probably been about 4-5 months of laminitis. The laminae are producing new wall cells at a constant rate but when separation occurs between the sensitive and insensitive laminae the rate of production increases dramatically and a lamella wedge is formed in the gap, this also increase the pressure on the hoof wall which in turn widens the gap(4).

What causes Laminitis?

Laminitis is commonly caused by a poor diet; feeding large amounts of rich feed to inactive horses is one of the leading causes. Spring grass affects some horses adversely after they have been on hay all winter. Other causes of laminitis can be abnormal concussion or weight bearing for the condition of the horse, high fever for an extended period of time and post-parturient mares with a retained placenta. In this paper I will be looking at the most common cause which is through toxins produced because of the diet(1).

Horses evolved to eat 20 hours a day, to forage rather than graze. In nature they eat little things of what they need. They have a small stomach and long intestinal tract. They are designed to eat a high fibre, low sugar diet(2).

Digestion starts in the stomach where there is a pool of acid that breaks down the feed which very quickly is passed into the hind gut where digestive bacteria are responsible for helping the horse break down the feed further. These digestive bacteria, of which there are many types to break down different feeds, sit in the gut in low levels waiting for their particular food and when it enters the hind gut then they start to increase up to a level and digest the feed, when the food source runs out they die back down to a lower, waiting level. When these bacteria die off they put off exo-toxins(their outer shells) and endo-toxins(their insides) which are toxic to a horse but when at a low, steady, normal level the horse is able to cope with it. However we like to feed horses 'meals' which means he has a large food intake then starves for a few hours before another large meal, or we have him on a lush green pasture, constant overload.

When we feed meals the digestive bacteria build into too high levels and then when the food source is gone and they die off the toxins are in much greater numbers and are toxic to the horse. When on lush grass the digestive bacteria build and build to huge levels, especially one particular bacterium which likes the high sugar levels of the grass. This bacterium is called *streptococcus bovis*. When this dies off it produces so much toxic waste it kills off the good bacteria in the hind gut which means the horse is unable to digest the fibre in the diet and this means that whatever it is fed it would starve(3).

“Research by Pollitt has shown that the laminae will not separate under mechanical force; the hoof wall will more likely tear before that happens. He has found that the laminae rely heavily on glucose for their attachment and when deprived of glucose they readily come apart.

The body will deplete glucose from non-vital organs such as the skin or hooves (basically the same thing as they are made from the same material) when in dietary shortage. This can occur when the horse is starving or having dietary abundance as both cause high acid levels. The high level dead digestive bacteria comes across as a poison to the body so the horses body will again remove glucose from the extremities allowing the laminae to readily come apart.

Pollitt has also found that there is a system within the hoof between the laminae that anchors it together but at the same time allows the hoof wall to grow past the static coffin bone. This is achieved by a chemical ‘nip and tuck’ of proteins called *matrix metalloproteinase's* (MMPs) which on a normal horse is at a steady constant rate but when a carbohydrate overload occurs there is a massive overload of *streptococcus bovis* causing a toxic poisoning. If this toxin gets to the hooves it causes the MMPs to increase their rate thereby allowing the laminae to come apart very easily resulting in the symptoms we know of to be laminitis”(4).

How to prevent Laminitis

As discussed in the previous section the diet of the horse is the primary contributing factor to it getting laminitis. It therefore stands to reason that we should look at our horses diet to prevent them from getting it.

Wild horses have to travel great distances to get enough food to keep them alive as most wild grasses are low in nutrients. In comparison our domestic horses are given huge amounts of high nutrient value grasses and large amounts of grain in one feeding then left for many hours with nothing in their stomachs. They also do not have to move very much and consume more sugar than the body can handle.

First look at your horses' lifestyle and assess their body condition to make sure they are not carrying excess weight in the 'danger' zones, crests along the neck and apple bottoms are the worst. Then try and decide what might be the trigger, if it is grass then try and limit the amount your horse eats and also what time of day the horse eats the grass.

“Sugars in the grass rise from 0% to 22% during daylight hours when the grass is using the energy of the sun to store energy and then overnight uses up the sugar for its growth. It is therefore better for your horse to be on the grass at night when the sugar levels are falling rather than rising. Long grass (over 3-4 inches in length) is also better as it has used up most of its growing sugars and is 'past its best', whereas very short grass, a typical starvation paddock, can actually be worse as the grass is stressed and producing high amounts of sugar to try and repair itself”(1). It would be better to have a dry lot with no grass and feed hay (that has had its sugar levels tested!)instead. Grazing muzzles allow a horse to be out all day with the rest of the herd, so it is better for its emotional well being, but only allowing it to get a small amount of grass. Another good idea is to create a narrow track around the perimeter of your field which will force your horse to move to find its food and thereby causing it to have more exercise.

If grain is the trigger for your horse either stop feeding it altogether or, if you really feel your horse can't do without it, feed it in smaller quantities more often.

If the trigger is mechanical make sure your horses' feet are trimmed regularly to help maintain tight wall growth to the coffin bone.

Exercise is essential for horses. Wild horses do up to 30 miles a day in search of food and water. Movement not only aids in blood circulation which in turn flushes out the harmful toxins but also helps improve the horses hoof.

Diet

Horses were designed to eat high fibre low sugar diets that trickled almost constantly through its digestive tract. They have a very small stomach in comparison to their size with a large hind gut specifically designed to break down the high fibre low nutrient value feeds they would find as they foraged on their travels.

It would be very hard for most domestic horses to be fed in this way as it is hard to produce hay and grass paddocks that would stand up to the way we keep our horses. We therefore have to adapt our methods of feeding. Almost all domestic horses do not require any extra grain for their energy output. If they were fed ad lib low sugar hay and forage they would achieve better energy levels and healthier bodies.

Horses do not require added sugar to their diet so should not be fed any extra molasses at all. Grain, such as oats etc., release fast acting carbohydrates which the horses hind gut bacteria respond aggressively to, producing the high levels of toxins talked about previously.

“Depending on what grass your hay is made from, what time of day it was cut and the quality of everything else that influences it i.e. soil, then the sugar levels in the hay can vary from 0% to 30%. This means that your horse could eat the difference equivalent to a bag of sugar in a day in different batches of hay”(1). This shows that it is worth getting your grass and your hay analysed.

Get your soil analysed to see what minerals it is deficient in and add that mineral to your horses feed rather than give a broad spectrum supplement as that means your horse gets what it needs, not an overload of things it doesn't need which cancels out any deficiencies.

In summary as to what to feed your horse it should be as simple as possible with no added sugars at all and only the minerals required by each horse depending on its individual needs.

How to treat Laminitis

Once you have realised your horse is having a laminitic episode the first thing to do is get the horse off the laminitic trigger and provide pain relief. As the most probable cause of laminitis is the diet or a carbohydrate overload then a dietary lifestyle change is required.

It is essential to relieve the mechanical forces on the now weakened laminae, because once weakened the laminae will continue to tear apart easily even after the trigger has been removed. This means that regular trimming will be needed to keep the hoof walls tight to prevent further damage to the laminae.

The horse's diet needs looking at as per the previous chapter and possible its weight needs reducing to a more health range.

Once it is able to move without too much pain a horse will recover quicker and better if encouraged to walk, provided a good heel-toe landing is achieved. The use of hoof boots or casts can help tremendously in these situations. The walking on the heels will stimulate circulation, thereby removing toxins from the hoof, and encourage tight wall growth and thick soles.

“A good suggestion to encourage walking is to make a ‘paddock paradise’ as described by Jamie Jackson. This is basically making a narrow track around the edge of your field with food, water and shelter all in different spots so that the horse has to walk to fulfil its needs”(1).

Teamwork between yourself, your vet and your trimmer is what is required to get your horse on the road to recovery from laminitis. You have to be vigilant at keeping the horse away from its trigger, checking its hooves regularly for abscesses(which are common with laminitis), flaring or cracking and getting x-rays and pain relief as needed from the vet so that the trimmer is in a good position for setting up the feet for recovery and future healthy hooves.

How to recognise Laminitis

“The signs you will see for laminitis will depend on the severity of the attack. The following is a list of usual recognised signs that point to a laminitic attack.

The horse may exhibit a reluctance to turn; laminitis usually attacks the front feet worse.

The horse will show less activity than normal if outside and there will be a reluctance to move or to be led.

The horse may lie down more than is normally observed.

The horse may seem depressed and ‘not themselves’; laminitis is a very painful condition for the horse to cope with.

The horse will have tight muscles, probably in its shoulders and haunches where it is trying to take the pressure off its feet.

The hooves will feel warmer than usual or one foot, the affected one, warmer than the others.

The horse will have a bounding pulse in the fetlock joint region.

There will be a pain response to pressure on the sole.

Blood may be seen in the white line.

The white line will be stretched.

There may be a ‘lamella wedge’ seen on the affected feet.

Fever rings will be visible on the outside hoof wall.

The laminitic stance; the horse stands with its forelegs stretched out in front and sat back on its haunches to relieve the pressure in its feet.”(1)

Founders

“Founders can be classed as the final stage of laminitis. Also known as the chronic stage or phase this usually involves rotation of P3 and also dropped sole due to penetration of the sole by the distal phalanx (P3).

Even a single episode of excessive grain consumption, either by accidental access by the horse or a misjudged intentional diet by the owner, can induce founders. Some horses suffer founders over a long period of time which causes anatomical changes within the hoof structure. The most commonly known is when P3 rotates or sinks.

When P3 sinks it takes the coronary band with it. This can be felt by a sharp edge of the proximal hoof wall at the coronary band. Initially this may only be dorsally felt, but the prognosis is poor if it extends around the coronet as it indicates that most of the lamellar attachment is destroyed.

Within a few days a convex bulge in the sole may appear beneath the sinking P3. In severe cases the resultant pressure causes the corium beneath P3 to prolapse completely through the horny sole.

Changes can also be seen in the hoof wall structure. The growth at the toe appears to slow down whilst continuing at the ‘normal’ rate at the heel. This causes the growth rings to no longer be parallel, they converge at the toe. In severe cases the different growth rates between the toe and heels produces a dramatic upturning of the toe and the hooves take on the appearance of ‘Aladdin’s slippers’.

Ultimately the prognosis is directly proportional to the severity and extent of lamellar and tubular (hoof wall) displacement and pathology. The more severe the ‘rotation’ the longer the road to recovery, but with regular correct trimming and the use of casts and hoof boots and with pain killers at the start, then most horses can be saved.

Some horses however do have remodelling of the tip of P3 due to its constant pressure with the ground. These horses lose some of the lamellar attachments and sensitive structures in this area and so would therefore be unable to grow a good new well attached hoof and, unfortunately, would probably be better off being euthanized.”(1)

Trimming and aftercare of a laminitic horse

As a trimmer trying to help a laminitic or foundered horse you need as much information as possible to aid you in the rehabilitation of the hoof.

X-rays of the feet, although not essential, are an invaluable tool for you to be able to see the degree, if any, of rotation or sinking of P3. As previously discussed the most important thing is to remove the laminitic trigger, or the horse from the trigger, and provide pain relief then the hoof trimming can be looked at.

Every effort should be made to keep the horse as comfortable as possible. Removal of excess flaring of hoof wall will ease the pain of the tearing laminae. This needs to be done as slowly and sympathetically as possible. If the horse is in too much pain to be able to pick a foot up, which puts too much weight and therefore more pain on the supporting leg, then the nippers can be used to reduce the excess wall whilst the foot remains on the ground.

Take the walls right back to the white line and if there is lamellar wedge then this can be cut into, leave this slightly thicker than you would normally as it is a softer, weaker substance than normal laminae. There should be no wall support at all. The heels should be as low as possible to try and lower P3 into a more normal position in relation to the ground.

Once the horse is as pain free as possible then trimming can be done along more normal parameters, with the heel length being dictated by the sole depth. Flaring should still continue to be removed with minimal wall support and a good roll all round to help grow a good tight connected hoof. A laminitic horse needs to be trimmed every 2-3 weeks to minimize flare stress.

“A new method of hoof support which provides frog and sole support is hoofcasts which can be packed with Equithane CS Sole pack or closed cell foam pads.”(1) This system comes as a resin filled bandage that is wrapped around the pad or sole pack and totally covers the hoofwall, sole and heels but not the coronary band. The bandage sets rock hard when exposed to the air and can be left on for up to 4 weeks as the horse improves.

Another system that can be used is hoof boots, again with foam pads and frog supports.” Easicare”(2) do a wide range of boots including a specifically designed laminitic boot.

Both of these systems protect the hoof and provide pain relief to allow the horse to start moving again. This is essential in the rehabilitation of laminitic horses as the movement causes more circulation in the feet which removes the toxins and the continual impact when landing correctly, heel first, begins the long process of building a better healthier foot.

CONCLUSION

It is the responsibility of all horse owners to make themselves aware of the dangers of laminitis and of how easy it is to prevent. Just by being aware of their horse's ideal weight and then monitoring that weight is a step in the right direction. Be aware of their actual nutritional requirements and try to provide as much of a natural living environment as possible. This will help minimize stress as well as reduce the risk of laminitis. Encourage your horse to move in the paddock and provide exercise to increase both mental and physical stimulation, and of course have your horses' feet trimmed regularly by a barefoot trimmer who understands the principles of allowing the hoof to build its own sole depth and concavity.

REMEMBER.....PREVENTION IS BETTER THEN CURE!

REFERENCES

What is Laminitis

1. Doug Butler -The principles of Horseshoeing(P3)
2. Induction of laminitis by prolonged Hyperinsulinaemia -Aspin K.E
3. Equine Laminitis current concepts- Chris Pollitt
4. Laminitis Update 03-20-05- Pete Ramey

What causes Laminitis

1. Doug Butler- The Principles of Horseshoeing(P3)
2. Jamie Jackson -The Founder Horse
3. Equine Laminitis current concepts- Chris Pollitt
4. Equine laminitis Glucose Deprivation and MMP Activation - French, Pollitt

How to Prevent laminitis

1. www.safergrass.org

Diet

1. www.safergrass.org

How to treat laminitis

1. Jamie Jackson- Paddock Paradise A Guide to Natural Horse Boarding

How to recognise Laminitis

1. www.all-natural-horse-care.com

Founders

1. Doug Butler-The Principles of Horseshoeing(P3)

Trimming and aftercare of a laminitic horse

1. www.equicast.com
2. www.easicare.com

