

**Laminitis** - Zoe Davies MSc.Eq.S.,R.Nutr.  
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Laminitis is a major cause of lameness and even death in horses. This disease appears most commonly in overweight horses and ponies and particularly native breeds and crosses, but not exclusively so. There are several causes of laminitis and these initially appear mostly unrelated to the hoof itself, these include soluble carbohydrate overload, retained placenta and trauma to the hoof such as excessive weight bearing following injury to the other forelimb. Perhaps the most common cause is pasture-induced laminitis. Horses with acute laminitis have a characteristic stance, leaning backwards to take the weight off the forefeet. Laminitis is a weakening or destruction of the laminae in the hoof and in the worst case the laminae can no longer support the weight of the horse and the pedal bone rotates or sinks downwards even protruding through the sole of the hoof. This condition requires the urgent attention of a vet.

The key problem with the disease is that once lameness is evident, some destruction of the internal structures of the hoof has already occurred and treatment then becomes a damage limitation exercise. Currently there is some very interesting research with cryotherapy that shows that standing the acute laminitic foot in 50% water 50% ice cubes mix may help reduce the damage in the foot, although this is still at the developmental stage

Prevention is therefore vital. There now seems to be a clear relationship between chronic obesity and insulin resistance. Although not all obese horses will develop insulin resistance, over time the risk increases. There is a genetic disposition to insulin resistance and laminitis and affected horses are usually very "good doers". This is the type that appears to get fat on fresh air, this is probably a throw back to the times when food was scarce in winter and they had to use up those fat stores they built up the previous summer to survive harsh winters ahead.

If horses and ponies remain obese for a long time, then insulin resistance becomes more likely and if chronic, increases the risk of laminitis developing.

It is thought that the horse's body has a limited (probably genetic) capacity to store fat. Once that limit is reached, particularly in skeletal muscle, the fat interferes with the action of insulin. This is fortunately a reversible process if caught in time, as IR can be resolved with weight loss and exercise.

In addition, from work carried out on humans, the overstretched fat tissue then begins to secrete substances into the blood, which are pro-inflammatory i.e. cause inflammation. So the chronically obese horse with IR is now in a pro-inflammatory state, which makes laminitis more likely. The obese, but none IR horse can cope with minor laminitic trigger challenges such as high sugar spring pasture but the chronic IR horse simply can't.

It is clear that the chronically obese horse or pony is effectively on a downward spiral increasing the risk of IP, laminitis and other health problems, however changes in management can play a large part in prevention of these problems, before the situation becomes irreversible and this is really good news.

The aim of management is therefore to change the IR horse to an insulin sensitive state, by slowly reducing the horses excess weight.

Laminitis Link

The trigger factors for starch/sugar-induced laminitis are well known. However the link with insulin resistance seems very important.

Laminitis can be induced experimentally by inducing severe insulin resistance.

Pasture induced laminitis for example is also likely to be linked to IR.

Temperate grasses are high in water-soluble carbohydrate, which consists of differing levels of sucrose, fructose, glucose and fructan. Fructan are increasingly linked with laminitis and consists of chains of fructose molecules joined together. Levels of sucrose and fructan fluctuate daily in pasture, being affected by environmental factors such as intensity and duration of sunlight, temperature, water availability, soil fertility and developmental and genetic characteristics of the pasture. As with all plants, grass uses sunlight during photosynthesis to produce energy in the form of sugars. At night there is no photosynthesis (no sunlight) and the plant uses up the sugars it has made during the day before. Sugar levels would therefore be expected to fall to their lowest levels at dawn. Fructans and sucrose exist

together in a normal balance but environmental stress factors cause sucrose to be used up at a faster rate. Grass also stores fructan in the lower portion of grass plant so closely grazed pasture will be higher in fructan. If night time temperature falls significantly, grass growth slows and more fructan accumulates.

Fructan cannot be digested in the foregut of the horse and therefore passes to the hindgut undigested and is rapidly fermented with the same consequences as discussed below.

The obese horse or pony is much more likely to consume greater amounts of pasture, if allowed free access at all times. These horses often have a ravenous appetite and just don't stop eating when turned out. This can result in huge intakes of sugars at certain times of the year potentially resulting in endotoxaemia.

Insulin resistance is involved in this scenario because researchers now think that this endotoxaemia triggers a systemic inflammatory response by the horse thereby exacerbating insulin resistance. The obese horse that already has IR may have real problems handling these extra transient IR attacks caused by endotoxaemia from dietary causes and succumbs to laminitis.

Horses that are thought to be susceptible may have relatively easy veterinary tests done. Some chronically obese horses and ponies may also show small degrees of pedal bone rotation on x-ray without having shown typical clinical symptoms of laminitis.

Management tips

- Reduce sugar and other soluble carbohydrate intake
- Reduce bodyweight in the overweight horse or pony.

The above can be acted upon in the following ways.

1. Eliminate all high starch based concentrates (including low energy cool feeds) from the diet. check with your supplier the starch content of the feed.
2. Feed later cut meadow hay with a low level of water-soluble carbohydrate (WSC) i.e. sugars of less than 12%.
3. Soak hay for 30 minutes in warm water if possible before feeding to remove as many residual soluble sugars as possible
4. Feed 2% of the horses bodyweight as hay reducing to 1.5% if not losing weight
5. Restrict access to pasture by strip grazing or reduce time out at grass to no longer than four hours. For severely affected horses and ponies, temporarily stop all access to pasture, use grass free areas instead such as arenas until a significant reduction in bodyweight has been achieved, but do not starve.
6. Turning horses out for four hours per day instead of twenty four can reduce sugar intake by as much as 80%. Also try and turn out horses only at safer times of the year i.e. not during grass flushing times and overnight if NO frost.
7. If the horse is sound, exercise wherever possible even walking out in hand
8. Take into account breed types and natural body frame when assessing condition
9. Monitor weight loss and retest for insulin resistance following weight loss programme.
10. Feed a multivitamin and mineral, performance level supplement or low starch balancer such as Gain Opti-Gro with a small amount of low calorie unmolassed chaff and unmolassed beet pulp (very dilute) if required.
11. In winter months restrict turn out on a sunny frosty morning and put horses out in the afternoon

For underweight laminitics, energy should be supplied as fat and fibre or low starch horse and pony cubes/fibre based compounds such as Gain Easy Go cubes which is 8% starch compared to a cool mix at typically 30% starch.

Supplementation with a high performance vitamin and mineral supplement may be useful whilst horses are in the painful acute stages of the disease.