



## Grass and Subclinical Laminitis

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*Originally published in the September - October 2009 issue of Equine Excellence magazine.*

When we gaze out the window at our horses playing and grazing together in spring on plenty of grass we may feel pleased to see our horses doing so well. Yet appearances may be deceiving and down the track we may find our horse's hooves showing clear signs of separation and tenderness, and maybe abscesses and seedy toe. Why is it more likely in spring?

Grass is by far the best feed, horses evolved on a fairly continuous intake of low fat and high fiber forage. Fiber is essential for healthy functioning of the digestive tract, it is not surprising to find horses on infrequent high grain/low fiber diets are more likely to suffer from colic and digestive upsets. All horses, even those on very heavy workloads need significant fiber in their diet and grass is an excellent source of protein, minerals and vitamins. All grass species, regardless of the quality of the soil they are grown in contain varying levels of these nutrients, without those nutrients the plants wouldn't be able to function and survive.

Though grass (and hay) is a nutritious feed it can also be a health hazard, especially grass developed to maximize growth rates in cattle. In spring,



warmer temperatures and cooler nights produce a lot of new growth, timed beautifully for the higher needs of pregnant and lactating mares. This new growth can be very high in easily digestible carbohydrates called sugars and starch and the first sign of a horse not dealing well with a high sugar and starch intake is subclinical laminitis.

Subclinical laminitis, as the name suggests, is a mild form of laminitis where the horse does not show any of the symptoms of the condition and is far more common than many horse owners realize. Often the horse owner is un-



aware of any episodes of subclinical laminitis yet the typical changes are there in the feet. If the cause is not removed then initially the horse may not show a lot of pain or discomfort in the hooves yet the hooves may undergo the following changes:

- Horizontal ridges (rings) on the exterior of the hoof
- Inflammation and eventual separation of the laminae or leaf like folds in which the pedal bone is normally suspended leads to a separation of the hoof wall from the hoof. This is seen as a widening of the laminae particularly at the toe and has the effect of making the horse more susceptible to hoof abscesses
- Rather than standing normally the horse will shift his weight from one foot to the other. If the hind limbs are more affected, the horse will stand with its front limbs back underneath to take more weight
- Demonstrate a reluctance to step out when ridden
- Reluctance to pick up feet.
- In time the laminitis could develop to tenderness on any surface with a strong 'bounding' pulse to the feet indicating increased blood flow and inflammation (heat) of the area. This chronic laminitis may then develop further with pedal bone rotation and solar penetration, known as 'founder'.
- Dietary laminitis is a very complex condition, and the likelihood of any particular horse getting it from excessive sugar and starch in the diet is influenced by numerous factors:
  - Seasonal variation, with early spring grass being the big risk. New shoots of grass are higher in sugar and starch
  - Type of grass – legumes such as clover and Lucerne [alfalfa] being particularly rich
  - Grass stressed from drought or frost is higher in sugar and starch
  - Horses that have had previous lamellar disease (whether from laminitis, puncture wounds or severe sole abscesses) seem more susceptible to subsequent bouts of laminitis
  - Overweight horses have a higher predisposition to laminitis
  - A horse in regular work is less likely to be affected.

What actually causes the separation of the laminae that support the pedal bone is under investigation. A recent RIRDC study showed that high levels of the hormone insulin triggers lamellar separation. Carbohydrates like sugar and starch are broken down into glucose. As glucose rises in the blood, the pancreas secretes insulin in response to the increased glucose. Insulin enables glucose to move from the blood into cells. A large and prolonged influx of sugar and starch will cause a large and prolonged rise in insulin and this has been demonstrated to trigger separation of the lamellae in the hooves though the actual mechanism is still unknown.

Sugars and starch are broken down in the stomach and throughout the length of the small intestine but if a significant amount makes it to the large intestine then the delicate balance of bacteria can be upset. The large intestine becomes more acidic, possibly damaging the intestinal wall so that it becomes 'leaky'. This acidity may cause many of the bacteria to die and release toxins that pass into the bloodstream through the breaks in the wall. The toxins are thought to alter the blood circulation within the hooves, or trigger the separation of the lamellae. Another theory suggests that when the intestinal environment changes, bacteria that produces laminitis triggering factors may overwhelm others.

### **How to manage horses prone to subclinical laminitis**

The prevention and rehabilitation of laminitis is all about removing the cause



– in this case the source of the excess sugars and starch in the diet. To minimize the risk, regular exercise is highly effective and can make all the difference between a horse that has to be deprived of pasture and one that can handle the high sugar and starch content. Domesticated horses kept in small paddocks are at far higher risk than non domesticated horses as they would be covering large distances rather than grazing and gorging themselves in a small area with little movement.

Ensure your horse isn't overweight. It isn't clear as yet whether it's the obesity that can reduce a horse's ability to handle a high level of sugar and starch or the high grain and often high fat diets. At an extreme this can develop into insulin resistance where an inability to respond to insulin occurs. A greater than normal amount of insulin has to be secreted to move glucose into cells, triggering laminitis.

For managing horses on pasture that are susceptible to subclinical laminitis it is useful to know when sugars and starch are at their highest. The safest time for horses to graze is between 3 am and 11 am in the morning as this is when sugars and starch are at their lowest. Grass growing in the shade is safer compared to grass in full sunlight and ditto for a cloudy day compared to a day without clouds to obstruct the sun.

If you need to prevent horses from grazing later in the day there are two methods that can be adopted.

First option is the implementation of a paddock paradise arrangement, Jaime Jackson, a barefoot enthusiast in America who came up with the idea, published in his book 'Paddock Paradise, A Guide to Natural Horse Boarding'. The paddock paradise idea is where a laneway is fenced off around the perimeter of a paddock using electric tape or around the perimeter of the whole property. Depending on the sugar sensitivity of the horses, either the grass may need to be killed or their grazing may limit the grass sufficiently. Low sugar and starch hay could be distributed in the laneway.

This would entail some initial effort and expense but it would mean that the horses could graze in paddock in the morning when sugars and starch are at their lowest and then later placed in the laneway for plenty of movement which a small dirt yard cannot provide. An extra benefit is that time in the laneway means the paddocks can be rested. Another benefit is that horses kept in paddock paradise type laneways are reported to move far more than horses in paddocks.

Second option is a well fitting and padded grazing muzzle. A muzzle will restrict grass intake late in the day when sugar and starch is highest but still allows drinking and socializing with other horses in the paddock. A little bit of grass can still be eaten in a muzzle.

The worst option that cannot be recommended is locking a horse up without feed. It means the horse is prevented from moving and getting exercise, no food can lead to digestive upsets and separation from the rest of the herd is distressing. Horses tend to gorge on grass when released if locked up for a period of time.

### **Is mowing a good idea?**

Mowing a paddock for hay and allowing a horse to graze the new growth is asking for trouble. The best growth stage for the lowest sugar and starch is when the grass has flowered and seed is spread. If any of the grass stills has seeds this may not present a problem even though the seeds like grains are high in starch but their proportion of the grass biomass is small and soluble carbohydrates in the above ground portion of the grasses drops dramatically

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after the seeds are set. Unfortunately though, some horses are so sugar sensitive that even the seeds will cause harm. Many insulin resistant horses cannot tolerate any grass, let alone mature grasses.

Ideally, allow the grass to be grazed when mature and once eaten down to about 8 cm move the horses onto another section or paddock of mature grass. If you do need to mow to manage large areas of pasture, larger than what the horses can eat then mow and wait 2 to 3 weeks for the re-growth to reach a height of about 25 cm. The re-growth will use up a lot of the sugar and starch for growth and turn it into protein and fiber. Rotational grazing is the best way to manage your paddocks and sugar sensitive horses who can tolerate some grass. The heights given are a guide only, it will depend on the species of grass.

### **What about hay?**

Hay can also be very high in sugar and starch. Growing conditions, time of day when harvested and stage of growth are most important. Sugars rise through the day on a sunny day, and decrease overnight when nights are warm. Mature stands of grass are safer than young, growing grasses. This means that unstressed mature grass cut early in the morning will be safer than grass harvested late in the day. Drought or nutrient deficient stressed grass will be higher in sugar and starch.

People who own horses sensitive to high levels of sugar and starch on predominantly hay diets often get their hay analyzed at a laboratory to find out how safe the hay is to feed. Soaking hay for up to 30 minutes can remove a significant amount of soluble sugars but won't reduce the starch levels. However, it is best not to soak longer as iron will be driven into the hay.

Dr Eleanor Kellon VMD, an equine nutrition specialist in America is convinced that iron overload is a risk factor for insulin resistance in horses as it is in people; hence any feed or supplements with high levels of iron should be avoided.

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