Owners and trainers who have been unlucky enough to have first hand experience of laminitis or founder are aware of the saying “A horse is only as good as its hooves”. After colic, laminitis is the second biggest killer of horses. Although some breeds can be more prone to laminitis, any horse can be susceptible to laminitis, if the conditions are right.

LAMINITIS AND FOUNDER – WHAT IS IT?
Laminitis is an inflammation of the laminae of the hoof. The Laminae are strong slightly elastic tissues that are found on the pedal bone (sometimes called the coffin bone) and the inside of the hoof wall. They nestle into each other similar to Velcro, connecting the hoof wall and pedal bone. The laminae carry the whole weight of the horse, so must be in perfect health. If the laminae becomes inflamed (laminitis), they are automatically weakened and in danger of tearing if the weight load is not reduced.

If laminitis is allowed to continue then the laminae can tear and the pedal bone and the hoof wall can move or separate. The pedal bone can rotate within the hoof. This occurs when the pedal bone only separates at the front of the hoof. The deep flexor tendon is anchored at the back of the pedal bone and the front tip of the pedal bone rotates downwards. Sinking occurs when the pedal bone separates in a uniform manner around the hoof wall and the pedal bone generally will move or sink in a downward motion. Corrective trimming, with the aid of x-rays to determine the type of movement of the pedal bone, during this time can help to reposition the pedal bone in the hoof.

The pedal bone can penetrate the sole of the hoof if it completely detaches from the inside of the hoof wall, this may coincide with haemorrhaging of the coronary band. This can involve severe pain and irreparable damage. Founder is usually referred to as chronic or long term laminitis where there has been movement of some type in the pedal bone.
Examples of a normal hoof and a foundered or laminitic hoof

Reference: Complete Equine Veterinary Manual, Tony and Marcy Pavord, 2005

What can cause laminitis or founder?
Over eating and gorging in ponies is the most common cause of laminitis. A survey has reported that grain overload and grazing lush pasture caused 50% of reported cases of laminitis. Although laminitis is a disease of the feet the cause is often found in other parts of the horse’s body. Any disease that raises blood pressure is a potential risk. Some of the causes are detailed below:

- Grain overload or sudden changes in the diet
- Access to large amounts of lush forage. High levels of sugars, starches and fructans found at high levels in some pastures. If they are not digested in the small intestine and spill over into the hindgut, the delicate balance of microbes in the hindgut can be affected, leading to production of toxins in the large intestine that has a negative impact on the laminae.
- A system disease that causes toxins to be released i.e. pneumonia, pleurisy, diarrhoea or purulent metritis (e.g. from retained afterbirth)
- Working for a fast or prolonged period on hard surfaces (especially with a heavy rider)
- Lameness from another cause increasing the weight load on the "good" leg
- Use of corticosteroids and some other drugs
- Hormonal imbalances such as that found in Cushings Syndrome.

What are the signs of laminitis or founder?
Laminitis and founder occur more commonly in the front feet but can affect one or all hooves. To detect laminitis before it becomes founder, develop the habit of feeling the temperature of the hooves, and learn to feel for a pulse over the sides of the fetlocks toward the back. If the hooves are hot or a pulse is obvious, immediate veterinary attention is needed.

Laminitis is painful and causes the horse to try to get weight off its front feet (the ones with the biggest weight load) by leaning backward thus transferring more weight to the hind limbs. Some horses lie down to avoid the load, but there are horses which don’t like to lie down. The sole can be sensitive to increased compression, especially when there has been movement of the pedal bone.
TREATMENT AND REDUCING THE RISKS OF LAMINITIS AND FOUNDER

If you suspect your horse has laminitis or founder, call your equine veterinarian immediately and remove the cause of the laminitis. This could involve dietary restrictions, removal of medications or intervention by your equine veterinarian i.e removing a retained placenta. Each case needs to be treated individually by your equine veterinarian, depending on the cause.

Nutritionally we suggest feeding a combination of Munga, Speedi-Beet, Performa 3 Oil and roughage to provide a balanced ration. This combination offers the following benefits:

1. **Provides a balanced ration** to supply the correct level of nutrients to aid the recovery of the laminae and membranes in the hoof. *Munga provides a balanced ration when fed to suggested levels with adequate roughage.*

2. **Steam extrusion improves digestion in the small intestine** – feeding a steam extruded feed or a feed with a steam extruded component will improve the digestion in the small intestine. This will minimise starches or sugars being fermented in the hindgut that can contribute to laminitis. *Munga contains a steam extruded component.*

3. **Feed an Omega 3 oil that contains DHA and EPA essential fatty acids.** Performa 3 Oil is an Omega 3 Oil supplement that contains the longer chain, beneficial fatty acids DHA and EPA. Getting the Omega 3:6 ratio right in a ration is beneficial in improving circulation and reducing inflammation, both of which may be of benefit to laminitic horses.

4. **Minimise sugar and starch levels.** This is achieved by:
   a. Feeding a concentrate that does not contain cereal grains and has a low starch and WSC level. i.e is low in sugar and starches. *Mitavite Munga is an ideal feed for a laminitic horse with a starch level of 5.2% and a WSC (sugar) level of 8.4%. It is fed at low rates and is concentrated so only a small amount needs to be fed with adequate roughage for horses to obtain the protein, vitamins and minerals they need without excess energy.*
   b. Roughage makes up a large part of the ration and the following should be addressed when feeding laminitic horses.

   Select pasture species that have a low sugar, starch and fructan level. Fructans, a sugar found in pastures has been linked to the incidence of laminitis in horses. The horse does not have the enzyme to break down fructans and they bypass the stomach and small intestine, moving into the hind gut where they are fermented, upsetting the microbial balance that can lead to laminitis and other digestive upsets such as colic.

   The level of sugar, starch and fructan found in a pasture will vary and depends on the species of the grass or legume, the growing conditions, temperature, time of day, stage of growth and the part of the plant (leaves tend to have a higher NSC than stems). Ideally if you are concerned about the NSC level in your pasture you should get the pasture tested for NSC levels.

   Try to keep away from pastures that have high levels of fructans. Generally cooler season grasses and those grown in temperate climates (perennial ryegrass) tend to have a higher NSC than the warmer season grasses (paspalum, Rhodes grass). As a general rule, C3 or temperate grasses store energy in the form of fructans, the bad sugar. C4 grasses tend to store energy as starch and the horse has the enzymes that can break down starches in the stomach and small intestine.

   Feed chaff and hay that have a low sugar and starch level. Cereal chaffs and hays are known to have a higher sugar and starch levels compared to other hays such as grass hay and mature lucerne hay.

   Feed alternative roughage sources. Selecting roughages that contain low sugar and starch levels that are well digested in the hindgut and contain high pectin levels are advantageous for laminitic horses. Super Fibres such as SpeediBeet have high pectin levels and are fermented slowly in the hindgut by microbes, releasing volatile fatty acids such as acetate, butyrate and propionate. These fatty acids provide energy for the horse. This combined with low sugar and starch levels provide an ideal roughage source for laminitic horses and can make up part of the roughage component of the diet.
Speedi-Beet offers the following advantages for horses:

- Highly digestible in the hindgut
- 95% sugar free and does not contain starch – Laminitis Trust Approved
- Provides non-heating, slow release energy
- Is beneficial in reducing dietary starch levels
- Holds 5x its own weight in water and is ideal for rapid rehydration
- Provides a prebiotic effect due to the beet fibre

Data for the above graph has been obtained from the Dairy One database.

\[
\text{NSC\%} = \text{Starch\%} + \text{WSC (sugars and fructans)}\%.
\]

c. If more condition is needed provide a high fat energy supplement that has a low starch level compared to other cereal grains such as Vitamite Power On and/or add Performa 3 Oil to the ration.
d. Soak Hay - There have been reports of soaking hay for a period (1 hour in cold water or 30 minutes in luke warm water) immediately prior to feeding, may decrease the water soluble carbohydrates (sugars) in the hay by approximately 15-40%. Discard the water after soaking the hay so the horse will not have access to it. If there is any hay left at the next feed, discard the old hay.
e. Test Hay – Obtaining a laboratory analysis of the sugar and starch level of the hay you are feeding will give an accurate indication of how safe the roughage is to feed.
f. Restrict Grazing – Research suggests that the cases of laminitis could be reduced by 50% if proper grazing and feeding management is implemented. During spring and autumn pasture flushes, at risk horses should have restricted grazing time, if the laminitis is caused by overloading the large intestine. Limiting the time at pasture reduces the risk of starch and sugar overload due to high sugar levels in grasses. The sugar levels in pasture are highest in the afternoons and evenings because photosynthesis allows the grass to build large stores of sugar. On the other hand plant sugars are low in the mornings because the grass has been in darkness overnight and sugar stores are depleted. If the horse will have access to pasture, allow the horse to graze in the mornings, but restrict access to grass from the afternoon through to mornings. Do not allow a horse prone to laminitis to graze on pasture that has had a frost on it overnight or if the pasture is stressed.
OTHER MANAGEMENT TECHNIQUES

Some other management techniques that can be incorporated into your regime to help limit the occurrence of laminitis are:

• **Keep Horse in a moderate condition** - Controlling the weight of your horse is the most important point to remember. If possible weigh your horse or use a condition score chart to assess the horse regularly. Allowing the horse to get overweight will make him or her more susceptible to founder.

• **Hoof Maintenance** - Regular trimming of hooves, pick feet out twice daily and keep him out of mud at all costs. Mud packs into the feet and creates spectacular sole pressure. Hooves should be checked and trimmed at regular intervals to encourage growth. Any concerns can then be addressed by the farrier and your equine veterinarian at this time.

• **Regular Exercise** - Regular exercise is excellent in helping to control the weight of a horse. If your horse is showing signs of founder you should consult your equine veterinarian before exercising your horse.

• **Cushings related Laminitis** – If the founder or laminitis is due to a disorder such as Cushings disease your equine veterinarian will be able to suggest a medication that can control these bouts of laminitis.

To help you with your ration formulation we have detailed a general guideline feeding a 300kg, 400kg and 500kg horse that is spelling or in sporadic work being fed a ration based on Munga with adequate roughage. This is a broad guideline and you will need to make adjustments to the ration depending on the response of the horse to the ration and your assessment of the horse. We suggest feeding roughage with a low NSC%.

Horse that is spelling or used for pleasure riding

<table>
<thead>
<tr>
<th>FEED – Daily</th>
<th>300kg</th>
<th>400kg</th>
<th>500kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>MITAVITE MUNGA</td>
<td>Approx 0.75kg</td>
<td>0.75-1kg</td>
<td>1-1.25kg</td>
</tr>
<tr>
<td>VITAMITE PERFORMA 3 OIL</td>
<td>50-100mls</td>
<td>100-150mls</td>
<td>100-150mls</td>
</tr>
<tr>
<td>Lucerne Chaff/Hay</td>
<td>1.25-1.5kg</td>
<td>1.5-2kg</td>
<td>2-2.5kg</td>
</tr>
<tr>
<td>Speedi-Beet</td>
<td>0.5kg</td>
<td>1kg</td>
<td>1kg</td>
</tr>
<tr>
<td>Soaked Meadow/Grass hay</td>
<td>3.5kg</td>
<td>4.5kg</td>
<td>6kg</td>
</tr>
</tbody>
</table>

If the horse is obese Super Amino 66 can be fed in place of Munga.

Understanding the signs and causes of laminitis and founder can help horse owners and trainers in preventing and treating this incapacitating disease. Incorporating a feeding regime tailored for laminitic horses and regular veterinary and farriery monitoring will help to prevent the disease from occurring and minimise future episodes. Further information on feeding laminitic or foundered horses can be obtained by contacting Mitavite at [www.mitavite.com.au](http://www.mitavite.com.au) or calling our toll free number on 1800-025-487.