

Laminitis and Dairy Cow Lameness

Laminitis is a term describing a common, but poorly understood disease affecting many intensively managed dairy cows. It has been blamed as the cause of many herd lameness problems (as it often does play a role) but there are many nutritional and management factors involved in the progression of laminitis to lameness. This summary should give dairy health managers a better idea of the significance of laminitis in their dairy operations and methods to limit its economic impact.

Laminitis (Founder) is an inflammation of the tissues deep within the hoof (see figure 1), not caused by invading agents such as bacteria (at least not initially). Specific causes range from the metabolic and digestive disorders seen with the sudden or long term overfeeding of high concentrate or low fibre diets, calving, severe inflammatory processes like mastitis or metritis, to influences localized within the hoof such as trauma, poor claw or limb conformation, lack of or excess exercise, genetics, body weight, quality of surfaces, pigmentation of claw, etc.

It is thought that severe changes in the body associated with disease or feed changes release poisons into the blood stream which affect the blood supply to the hoof. Tissues that are responsible for producing new hoof material swell up and are damaged by this alteration in blood supply. These tissues, in turn, become inflamed and leak blood and fluid into the hoof material giving laminitic hoof its characteristic yellow or blood stained appearance.

Acute Laminitis

Acute laminitis can cause severe four leg lameness as the tissues swell in the cramped region between the hoof wall and the bone in the hoof itself (see figure 1). Often the cow tries to stand with all feet in one spot or the front feet will be placed far out in front of the cow in an attempt to take weight off the toes. Sometimes the cows will stand up on their back legs and remain on their knees at the front. This severe form is not as common as the chronic form.

Chronic Laminitis

Chronic laminitis often occurs when cows are exposed to frequent nutritional and environmental stress. It can be seen in heifers on high cereal silage diets, cows fed concentrate in large boluses infrequently (as in parlour feeding), and animals forced to stand for long periods on concrete. The inflammation in the foot may not cause immediate lameness in this form of the disease, but with time the hoof that is produced is soft and susceptible to bacterial attack.

Commonly, cows with this syndrome will have many horizontal lines on the hoof often referred to as 'hardship' lines, with the top of the hoof developing a concave surface with the toes extending into the air like a 'slipper'. The angle the top of the hoof forms with the floor is reduced from the normal 45 or 50 degrees to 35 or 40 degrees. The heel becomes worn down as the cows shifts her weight back off her toes, and structural changes in the back feet force the cows to walk with their hocks close together with their hind feet pointing outward. The slow, hunched gait of cows with chronic laminitis is seen on many farms.

Secondary Lameness

Secondary problems come with abnormal hoof growth. Several weeks to months after the bout of laminitis, weakened hoof comes in contact with the often wet and soiled environment of many intensive dairy farms. Bacteria will often make their way into the sensitive regions of the hoof through the white line - the junction between the sole and the hoof wall on the bottom of the foot

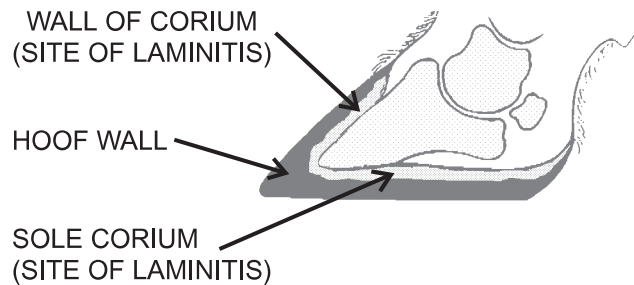


Figure 1 : Cross-section of the hoof showing bones and internal tissues.

(see figure 2). Sole abscesses and under-running sole can occur when bacteria enter this area of damaged hoof. Separation of the heel horn may contribute to the formation of heel erosions and cracks. Sole 'ulcers', characteristically seen at the sole/heel junction, are thought to result from the combination of abnormal hoof growth and excess weight bearing in this region of the sole and pressure from the pedal bone which often 'drops' down placing extra pressure on the sole tissues from above. When a sole ulcer ruptures out through the damaged hoof, bacteria can invade deep into the foot.

Lamenesses not directly linked to laminitis are foot rot, interdigital corns, and hairy heel warts (digital dermatitis). Sharp rocks and metal can penetrate healthy hoof horn as well as soft laminitic horn so rough or debris covered traffic areas should be cleaned, covered or fenced off.

Preventing Laminitis

- All feeding changes should be made slowly. The most important time for this is the transition from the dry cow ration to the lactating ration. There should be a 10 to 14 day steam-up period for dry cows to get them eating up to about 0.5% of their body weight in concentrate dry matter at freshening.
- When challenging fresh cows with concentrates to peak milk, try not to exceed 0.5 kg of increase per day so that cows are not eating maximum concentrates until at least 30 days in milk. Larger increases can lead to rumen acidosis and laminitis.
- Total mixed rations (TMRs) are preferred over separate forage feeding. Cows offered forage separately do their own ration balancing and may not consume adequate amounts of fibre. One of the worst laminitis herds I have seen occurred where dry cows (fed no concentrate) went directly onto a

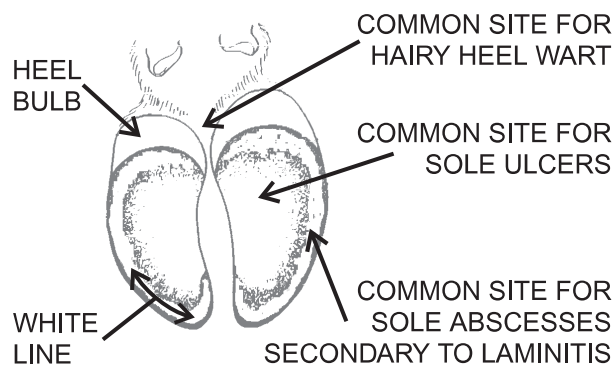


Figure 2 : Hoof structure showing typical sites of common ailments.

base TMR containing 5 or 6 kg of concentrate per head per day 10 days before freshening. The solution for this herd was to put a computer feed station in with the dry cows for gradual steam-up.

- Small concentrate meals through the day are better than two large feedings.
- Feed concentrates that contain a buffer such as sodium bicarbonate and/or magnesium oxide. Cows not used to buffers need to be gradually introduced to them because of palatability problems.
- Minimize the stresses at calving with roomy, clean freshening areas. Provide proper nutrition and environment to dry and freshening cows to help prevent retained placenta/metritis complex and acute mastitis.
- Try to avoid over fattening your cows, Cows with condition scores over 4.0 have more calving problems, more metabolic problems associated with freshening and poorer appetites than their leaner herdmates (3.0 - 3.5 condition score). All this combined with more weight on their feet can lead to more laminitis.

Preventing Lameness from Laminitis

- Dry dirt paddocks and pasture are healthier environments for the hoof than manure, urine and concrete. Moderate exercise may also decrease the severity of laminitis.
- If cows are on concrete year round, ensure a concrete surface that is neither slippery nor particularly abrasive. Scrape alleys once daily or more frequently if manure build up is occurring. An adequate number of comfortably designed free stalls should encourage cows to stay off their feet - there should never be greater than 10% more cows than freestalls. Design the barn so that feeders and waterers, are only a short distance from the resting areas to prevent unnecessary walking on concrete.
- Regular hoof trimming is a must to prevent the permanent changes that occur with chronic laminitis. All cows should be trimmed twice yearly with problem cows seen even more frequently.
- Foot baths can be used to harden and disinfect the hoof. Formaldehyde or copper sulfate have been used once or twice weekly at 2 to 5% with some improvement in overall foot health.

prepared by :

Daniel H. McDermid, DVM
Greenbelt Veterinary Services
Chilliwack, B.C. (604)792-1501