



PERFORMANCE PRO-BIOTICS
DIRECT-FED MICROBIALS

LAMENESS IN DAIRY CATTLE

www.performanceprobiotics.com

Last Updated **Nicola Brazier** | April 2012

Recent wet weather across the country has caused all sorts of problems, lameness in our herds being one of them. The cost of lameness to dairy producers is enormous. Figures from around the globe indicate that one case of lameness costs in the order of \$250 - \$300, including vet expenses, discarded milk as well as reduced annual milk yield, reproductive inefficiency and culling. Therefore we have quite an incentive to reduce the incidence of lame cows.

Nutrition can play a big role in prevention of lameness, and most farmers are mindful of this. However wet, muddy conditions always seem to take their toll. An understanding of the hoof anatomy and the types of lameness may highlight areas where improvements can be made.

Locomotion Scoring was introduced in the late 1990's as a guide to identify lame cows before intake and milk yield suffers. While scoring of herds has not taken off, the scoring guide gives some harsh data with regards to drops in potential income. By the time a cow begins to limp, Dry Matter Intake has dropped by 7% and Milk Yield has dropped by 17%. If this occurs in the first 30 days of lactation, conception rates and pregnancy rates drop significantly, and the chance of Ovarian cysts and culling increases. Figures 1 and 2 show results from two trials and highlight the impact that lameness can have. The earlier cost of \$250 - \$300 per case of lameness is certainly believable!

Figure 1. Locomotion Scoring Guide and impact on Dry Matter Intake and Milk Yield (adapted from Robison, P.H., 2001, University of California)

Score	Description	Back	Assessment	Dry Matter Intake Reduction (% vs Score 1)	Milk Yield Reduction (% vs Score 1)
1	Normal	Flat	Cows stands and walks with a level back. Gait is normal.		
2	Mildly Lame	Flat or arch	Cow stands level backed, but develops an arched back to walk. Normal gait.	1	0
3	Moderately Lame	Arch	Arched back is evident while standing and walking. Gait is short strided.	3	5
4	Lame	Arch	Arch back is always evident and gait is one deliberate step at a time. Cow favours one or more legs/feet.	7	17
5	Severely	3 legged	Cow demonstrates an inability, or extreme reluctance to bear weight on one or more limbs/feet	16	36

Figure 2. The Impact of Lameness in the first 30 days of Lactation on Reproduction (Mendez et al., 2002, University of Florida)

	Lame Cows	Control Cows
Days to first service	99	94
First service conception rates %	17.5	42.6
Ovarian cysts %	25	11.1
% pregnant 480d postpartum	85	92.6
% culled before any reproductive event	30.8	5.4



PERFORMANCE PRO-BIOTICS
DIRECT-FED MICROBIALS

LAMENESS IN DAIRY CATTLE

www.performanceprobiotics.com

THE HOOF STRUCTURE

Knowledge of the hoof structure enables us to better understand the problems causing lameness, and in turn how better to treat and prevent such issues.

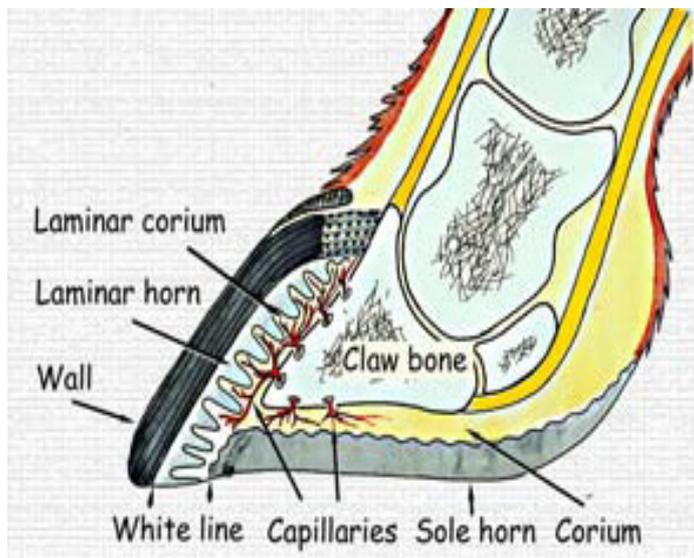


Figure 3. Hoof Structure

(from Bergsten, C., www.txanc.org)

The hoof consists of two claws, with an area of hairless tissue between, called the interdigital skin. The hoof wall and sole are made from keratin, and are referred to as the hoof horn, with the sole being much thinner (less than 1 cm) than the wall. Beneath the horn is the corium, where blood vessels and nerves are located. Laminae sit within the wall of the hoof, attaching the wall to internal structures, and are responsible for the grooves of the hoof wall. The white line sits between the wall and the sole and is the softest of the external hoof tissue. These features can all be seen in Figure 3.

Most simply, foot rot, warts and dermatitis are associated with the interdigital skin. Sole Abscesses are infections within the corium caused by external injury to the sole, while Laminitis is more of an internal problem, which causes secondary issues of White Line Disease and Sole Ulcers. Laminitis seems to be the greatest contributor to lameness in the US and Europe, while the general perception is that footrot is the main cause in Australian herds. However, actions to harden hooves have reduced lameness in many of our herds, indicating there are other problems involved.

KERATIN

There are a number of factors that will impact the hardness of keratin, and thus the hardness of hooves. Keratin production, and its strength, relies on delivery of the correct nutrients via the bloodstream.

Sulphur amino acids (methionine, cysteine and histidine) as well as minerals including Zinc, Copper, Manganese and Calcium all play crucial roles in ensuring keratin is structured for maximum strength. Vitamins A, D and B12 are also important, and the vitamin Biotin is now recognised as playing a key role. Requirements for all of these vitamins and minerals increase when cows are fed higher levels of supplements and when demand for milk production increases.

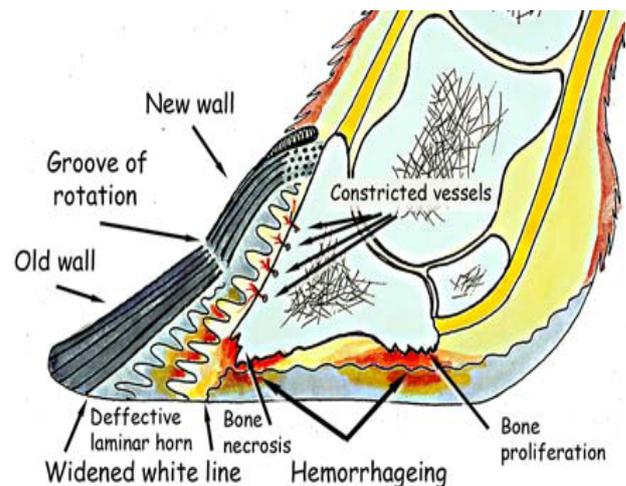


Figure 4. Laminitis

(from Bergsten, C., www.txanc.org)

When blood flow is compromised by factors such as acidosis, the hoof circulation shuts down and less oxygen and nutrients are delivered. The result is Laminitis, with poorer keratin production and higher susceptibility to external injury. Internally, the attachment of the bones is disrupted and the claw bone is able to sink and rotate, effectively bruising the corium from the inside. Haemorrhages and sole Ulcers are the result. Additionally, movement of the bone within the hoof can result in irregular grooving of the hoof wall and widening of the White Line (Figure 4). A wider white line means even more soft tissue and further susceptibility to damage and infection.



PERFORMANCE PRO-BIOTICS
DIRECT-FED MICROBIALS

LAMENESS IN DAIRY CATTLE

www.performanceprobiotics.com

We need also consider the impact of the environment on keratin strength. The hoof is able to absorb water, which makes the keratin significantly softer and thus more prone to injury. It is unable to dry as fast as it absorbs water so management factors to prevent cows standing in water or mud are imperative.

THE IMMUNE SYSTEM

Laminitis caused by acidosis is primarily a nutritional problem. However the cow's ability to fight infections will help reduce the extent of infection in the hoof. This is particularly significant in the case of footrot and abscess, but also for some of the problems considered secondary to laminitis.

Probiotics have a proven effect on immune function, and two of the bacteria selected by Performance will directly stimulate the immune system (*Bifidobacteria longum* and *Bifidobacteria thermophilum*). Selenium and Vitamin E are also widely recognised as antioxidants and proven to improve the cow's ability to fight infection. Calcium is another key mineral tied up with the immunity status of animals, as is Iodine. Zinc, in addition to its role in keratin production, will improve wound healing and improve skin integrity, thereby having numerous impacts on hoof health.

MANAGEMENT FOR REDUCING THE INCIDENCE OF LAMENESS

Nutrition to improve keratin integrity will take time. It takes up to three months to impact the hardness of the sole horn and up to 20 months for the wall horn to grow from top to bottom. It is faster to impact the immune system and farmers need to ensure that minerals and vitamins are included in the diet at all times. The Performance Healthy Herd range contains excellent levels of trace minerals and vitamins, and the Hoof Boost range contains additional organic minerals as well as the vitamin Biotin. Farmers can source Biotin separately if required and the best results will come from a feeding rate of 20mg Biotin per cow per day.

Final nutritional considerations are those to prevent acidosis, thereby reducing the incidence of Laminitis. A high incidence of lameness in the first two months of lactation should be closely examined to determine whether subclinical laminitis and acidosis are playing a role. Pink striations and sole haemorrhages are primary indicators that laminitis rather than footrot is at play (see figure 5).

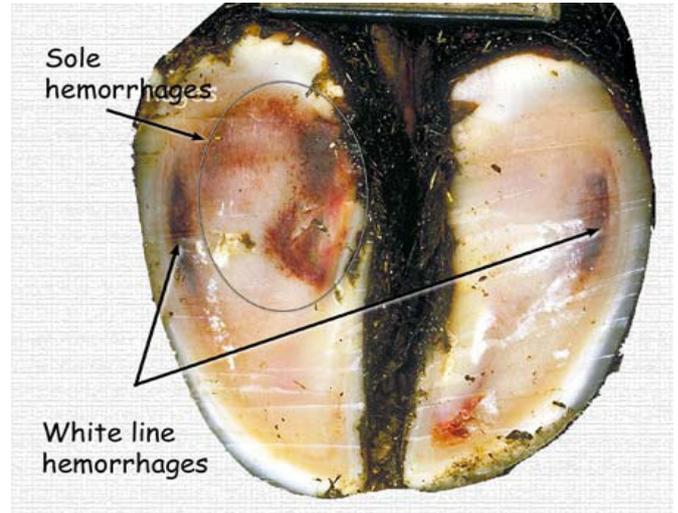


Figure 5. Sole Ulcers and White Line Disease

(from Bergsten, C., www.txanc.org)

Changes to rations, particularly increases and introduction to grain, should be made gradually when possible. Advice in this area is readily available through Performance as well as other avenues. Care should also be taken to ensure that correct grain:forage ratios are employed and buffers, including probiotics and yeasts, can be of assistance.

Maintenance of tracks and laneways is imperative, although costly. A width of five metres is recommended for herds over 200 cows, with correct crowning and sufficient drainage. Hedges should be trimmed to ensure that tracks dry quickly in wet conditions. If necessary, first upgrade those areas of highest use such as the areas closest to the dairy. Woodchips have given excellent results and are not abrasive if trodden onto cement yards, although availability and practicality will vary from region to region.

Movement of herds should allow individual cows to choose their steps. Aggressive dogs (and workers!) only speed up the cows at the back of a herd so are futile most of the time. A good guide for walking speed is 45 metres per minute, or between 2.5 and 3 kilometres per hour. This is a perfect time to observe the way cows are moving, detect irregular movement and be able to intervene early in the case of lameness.

Regular hoof trimming will ensure that weight is distributed to the outer walls, as well as properly diagnose problems causing lameness.



PERFORMANCE PRO-BIOTICS
DIRECT-FED MICROBIALS

LAMENESS IN DAIRY CATTLE

www.performanceprobiotics.com

Foot baths or mats are an excellent treatment for footrot and disease of the interdigital skin. A solution of 10% copper sulphate or 20% zinc sulphate should be used, and baths should be located so that they remain reasonably clean and cows hooves remain clean after exiting – this can be a challenge. Mats (or even shaggy carpet) are a great option and can be placed just prior to cows entering the platform. When located here, they can be easily hosed off during milking and topped up with solution. Additionally cows are standing on a relatively clean surface directly after walking over the mat.

As with all farming practices, there is a balance between the most practical solution and the most ideal. There are a number of solutions discussed, some easier to apply than others, but an understanding of what is going on in the hoof should help prioritise areas of action if lameness is an issue. A case of lameness acted upon immediately will see only a slight drop in dry matter intake and milk production, however if left two or three days, milk will drop up to 20%. The key is to act early and correctly diagnose the cause. Please contact Performance for access to nutritionists or for further information on their products.

DISCLAIMER Whilst all care has been taken in the preparation of this material, it may contain inaccuracies or typographical errors and may be changed or updated at any time without notice. Performance Probiotics makes no warranties or representations, express or implied, as to the accuracy, quality or fitness for purpose of the contents of this material. Performance Probiotics accepts no liability or responsibility for any losses or damage incurred by any party, including indirect or consequential losses or damage, as a result of the use of this information.

New South Wales & Tasmania

Jason Chesworth
0427 760 136
jason@performanceprobiotics.com

Western Victoria & South Australia

Tom Newton
0439 773 145
tom@performanceprobiotics.com

Northern Victoria & Gippsland

Jackelene Norrie
0438 721 242
jackelene@performanceprobiotics.com

Head Office

Brisbane
1800 118 872
admin@performanceprobiotics.com