

PHYSICAL LAMENESS

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Introduction

Lameness is the dairy industry's biggest animal welfare problem and the problem is growing.

A farm with a continuing lameness problem must correct the causes if they are obvious or seek help if they are not. It is no longer acceptable to say, 'This has always been a lameness farm' or, 'Lameness is just part of having a large herd'.

What is an acceptable level of lameness? In smaller herds it is now common to have incidences of 7% or lower over a 12 month period. In larger herds, 10% or less is achievable and should be the target.

Ninety per cent or more of lameness involves only the foot. The possible causes of foot lameness in New Zealand include physical damage, dietary problems, infection and poor conformation. However, I am convinced that the most common causes are physical. My experience with pasture-fed herds all over New Zealand is that, where a farmer has predominantly sole injuries or white line lesions accounting for a majority of his foot lameness, the causes will be physical. Therefore, emphasis on reducing physical damage will have the most dramatic results. A closer look at where we see sole injuries and white line injuries (66% of lameness) gives us more insight into what is happening.

Physical lameness is a problem – where do we start? Start with observing and understanding what is happening then take the required action to minimise foot damage.

Lesions causing foot lameness

A survey of 3058 lame cows treated by the author over the last 6 years shows:

White line lesions	38%	Separation of sole and wall with an abscess ascending up to the coronet
Sole lesions	27%	Bruised sole, thin sole or penetrations
Axial cracks	14%	Cracks in the walls between the claws
Foot rot	8%	Infection of the skin between the claws.
Proximal leg	6%	Injuries or infection above the foot
Solar ulcer	1.7%	Pressure from pedal bone on the sole
Miscellaneous	0.3%	
Unknown	4.5%	

Observations that suggest the cause of foot lameness to be physical injury of an otherwise healthy foot

Studies and visits to farms with both low and high incidences of lameness over the last 20 years have led to the following observations.

Foot shape

Lame cows generally have well shaped claws. There is no difference in foot shape between cows on farms with a high incidence of lameness and cows on farms with low incidence of lameness.

Claw structure

The sole and wall structure of lame cows is usually healthy.

Hardship lines

Hardship lines on the wall of the claw give a history of the dietary changes and health of a cow. These lines migrate parallel to the coronet. Where there is a dramatic change in the diet of a herd, every cow will have hardship lines giving evidence to the fact. If dietary change was an important factor in high lameness we would expect to see evidence in the nutrition lines. In the herds I have examined I do not see differences between high and low incidence lameness herds.

Sole thickness

We observe that in herds with a high incidence of lameness the soles are worn thin early in the season – physical damage. Thin soles are already a physical insult and predispose to both sole injury and separation of the white line.

Case-control study

A case control study (Chesterton et al. 1989) of 62 herds in Taranaki found two significantly different factors between lame herds and non-lame herds. The significant factors were track maintenance and patient handling of the herd. Both of these are physical factors. (Because the predominant lameness conditions were white line and sole lesions, the implication is that these two conditions are physical lameness.)

Follow-up study

A study (Sauter-Louis et al. 2004) of 10 herds with an ongoing history of sole and white line lameness showed that cows are more likely to develop lameness if they are at the rear of the herd on the track and in the milking yard.

Because it is the rear group that is most affected physically by the presence of the herdsman, or the backing gate, the implication is that the lameness was more likely from injury than any other cause.

Sole injuries

Sole injuries are more common on farms with track problems. Repair and maintenance of tracks reduces this type of lameness.

White line lameness

We see white line lameness where there is herding pressure on tracks or yard. Careful handling reduces the lameness.

Rain effect

Herd lameness increases with periods of increased rainfall.

Rain exaggerates all the physical factors that cause foot wear. For example, sharp base material on the track is exposed when rain softens or washes away the top surface. Gravel is carried onto concrete surfaces affecting cow flow and tests the patience of staff.

Where does physical lameness happen?

Foot damage is most likely to occur as the cows walk along tracks, congregate in the milking yard or enter and exit the milking bails.

In the normal day of a cow, many physical factors can combine to cause severe foot wear and physical lameness:

- Damaging track surfaces particularly if close to the shed
- Pressure herding, causing bunching up and poor foot placement on the track
- Herding in the dark, even if the pressure is only slight
- Gravel and stones on concrete surfaces
- Pressure from backing gates used to push cows
- Cows twisting and turning on concrete (eg. to escape the chains of a top gate)
- Pressure in yards too small for the size of the herd
- Poorly designed yards where cows have to readjust their position to find their milking order
- Stray electricity causing fear in cows
- Slippery concrete where foot placement is compromised
- Poor bail entrance design where reluctant cows are forced into a milking position
- Bail exit areas where cows have to make sharp turns to leave the shed
- Foot-baths where gravel and stones accumulate.

If farmers can appreciate these problems they are one step closer to reducing a physical lameness problem.

Sole and white line lameness

A further insight into what is actually happening where we find sole and/or white line injuries has been gained by a recent survey of our data on 3058 lame cows treated during the last six years.

Foot positions of sole lesions

The position of sole injuries is more random than white line lesions.

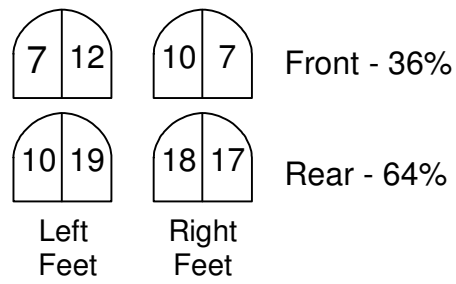


Figure 1: Sole injuries in Cows and Heifers. Schematic diagram of feet, showing claw involved. Numbers indicate injury occurrence in percentages.

The distribution may be explained by physical factors. Sole injuries are more random and have the same distribution in both cows and heifers. They are more common where tracks are longer than one kilometre, where the track surface is damaging to the sole and where gravel and rocks are commonly carried onto concrete surfaces.

Foot positions white line lesions

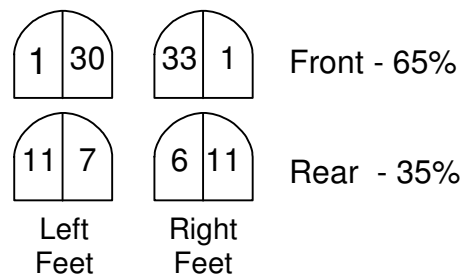


Figure 2: White line injuries in Heifers. Schematic diagram of feet, showing claw involved. Numbers indicate injury occurrence in percentages.

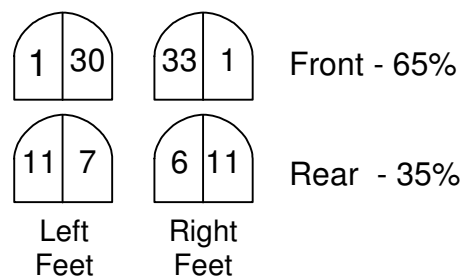


Figure 3: White line injuries in Cows. Schematic diagram of feet, showing claw involved. Numbers indicate injury occurrence in percentages.

White line lesions are very specific and the distribution is different in heifers (first calvers) and adult cattle. The position of the lesion can be understood by observation of cattle under pressure from a herdsman or backing gate. In adult animals the lateral back claw is under the most pressure. In first calvers the front medial claw is often under the most pressure as the lower dominant animal reverses out of tight situations. The lesion is not a random puncture wound. It is a result of physical damage to a claw slipping or twisting on a hard surface. The white line junction between the wall and the sole of the foot is opened up allowing gravel to enter. This lesion is often bilateral and easily explained when we see cows pushing, sometimes from the left and sometimes from the right; a physical injury.

How to reduce or solve a physical lameness problem

First write down the predominant injuries, white line or sole or both, in order to understand the problem.

If sole injuries are the main injury (thin tender soles, bruised sole or sole penetrations) look at track construction (length of track, track surface, gravel transport onto concrete) – correct if necessary. If the tracks are longer than 1km they should be considered “long”. The most common

problem area of the track is the entrance to the milking yard where the track meets concrete. If two or more tracks join at the shed it is important to build a concrete pad where the cows turn to enter the shed. All track surfaces must be crowned to allow water to flow to the sides of the track and through channels to drains on the paddock side of the fence. The walking surfaces must be 'foot friendly'.

If white line injury is the predominant injury, look for areas of **pressure** on the track or yard or both. In the herds with predominantly white line injury that I have investigated, more than 75% involve pressure in the **milking yard**. To identify the pressure areas, **observation** during handling on the track and in the yard is essential. Look for signs to indicate excessive pressure: heads up, cows tight in yards, cows reversing out of tight spots or bail entrances, legs at angles anchoring against pushing.

Pay particular attention to backing gates. In round yards the end of the gate must not travel further than 1 metre in 5 seconds (12 metres per minute). In square yards the gate must not travel more than 0.5 metres in 5 seconds (6 metres per minute) or excessive pressure is likely to occur. The top gates should have the same limitations.

It is important to remember that cows are creatures of habit. In large herds where there are many staff members and often a regular turn-over of staff, the herd becomes confused by the different ways staff use the backing gates. Some turn them on for extended times, some try multiple short movements. With top gates, I have seen herds totally confused with cows turning and twisting to escape the chains. Maybe every staff member has good reasons why they use the gates in their own special ways, but the cows do not know what to expect. Each farm must standardize the routine. If a set routine is not used, cows never settle into a regular flow and twisting and turning results in white line wear and eventually lameness.

Four steps to prevent physical lameness

First: Look at your own and your cows' behaviour

- Let the cows drift home
- Do not let your dog touch the cows
- Shout, whistle, talk or even sing to your cows if they slow down, but do not force them
- Watch the rear group of cows and make sure their heads stay down (heads up – they are being pushed) on the track and in the shed
- Watch the rear group of cows and make sure they are not pushing against each other (cows do not like body contact) on the track and in the shed
- Do not come out of the milking shed to get cows into the bails
- Do not move the backing gate for 15 minutes after herd enters yard (cows need time to reorganize into a milking order)
- Use the backing gates to take up space, not to push cows

- Control backing gates and top gates with exactly the same routine by all staff (cows are creatures of habit).

Second: Look at your milking shed area

- Wide, straight, level, well drained track approaching shed
- Nib wall to stop wash water flowing onto track at junction with concrete
- Entrance from race straight into yard or gently curve
- Wide entrance gate: at least as wide as the race
- Plenty of space in yard to congregate: 1.3 sq. m per Jersey cow, 1.5 sq. m per Holstein
- Any other factors that would make cows fear the yard (slippery concrete, stray voltage, electrified backing gate)
- Always turn off the electric fence unit before milking (source of most stray voltage)
- Use timer switches on backing gates to limit forward movement to a maximum of 5 seconds.

Third: Look at your track

The ideal track is:

- Well designed
 - firm, compacted base material
 - crowned to keep water off (maximum 8% slope)
 - non-damaging walking surface
 - well-drained to the paddock side of the fence
- Wide: 5 metres minimum, 200 cows – 5.5m; 300 cows – 6 metres; 400 cows 6.5 metres; 500 cows – 7 metres (Bridges 1985)
- Even width, or even better, getting wider as it reaches the shed
- Level: steep areas should be reduced, particularly close to the shed
- No congestion points: avoid right angle bends, narrowing of race, mud holes, excessive crowning
- Always spend money on the tracks closest to the shed first (unless you are a millionaire)
- No track is perfect, be extra patient at problem areas.

Fourth: Fine tuning

- Use meal or molasses etc. to attract cows to the shed early in the season
- Attend to any problem areas: shaded areas of track, drainage of under passes
- Junction of concrete with gravel: use lime, race rock or pumice as a transition material to absorb gravel from the track
- Footbath in exit race from shed: if infection between claws shows up (simple foot rot) treat the herd twice weekly during problem times

- Split the herd, particularly early in season if a large herd, to reduce pressure and time in the yard.

Conclusion

The observations and studies described in this paper suggest physical damage to the foot to be the main cause of lameness in pasture-fed New Zealand dairy herds.

The first approach to a lameness problem should be to identify and correct the causes of physical damage to the foot.

References

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