

THE COST OF LAMENESS IN IRISH DAIRY HERDS

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Introduction

Lameness is a painful condition which severely compromises cow welfare, is a common cause of culling, significantly negatively impacts on fertility performance and milk production, and also impacts environmental sustainability as a result. When accounting for the production effects of lameness, the treatment costs and the indirect costs, it has been repeatedly proven that lameness is one of the most significant economic, health and welfare issues facing the dairy sector worldwide.

The vast majority of all lameness in dairy cows is due to lameness involving the foot. Foot disorders can be divided into two main categories: non-infectious (including white line disease, solar haemorrhages and sole ulcers) and infectious diseases (including Mortellaro's digital dermatitis, foul in the foot and interdigital dermatitis). The main lesions causing lameness on Irish dairy farms are non-infectious.

A lameness prevalence above 10% is considered the threshold above which intervention is needed, but even in herds with a lameness prevalence close to this threshold, up to 25% of cows will have one lameness event per year. A recent study investigating welfare in Irish herds showed that the best performing farms had less than 5% lame cows in their herds, indicating that a low level of lameness is achievable within a pasture-based system.

The economic costs of lameness are significant; lameness is estimated to be the third most costly health issue of dairy cows after mastitis and fertility. The costs arise both directly and indirectly; direct costs include additional expenditure that is directly linked to the case of lameness (such as additional farm labour, cost of hoof trimming and veterinary treatment, decreased milk production and the cost of milk withdrawal if milk has to be discarded owing to drug treatments), while indirect costs arise due to the side effects of lameness. These include reduced reproductive performance and early culling. The greatest costs related to the disease are generally losses in production, such as reproductive performance and milk yield, but these costs may be the ones which are easiest to forget, as there isn't a tangible immediate cost related to them.

Lameness and Milk Yield

Numerous studies have shown that lameness lowers the milk yield of dairy cows. This happens for a number of reasons: 1) lame cows are in pain, and as a result prefer to spend more time lying down to take the weight off the painful limb, at the expense of eating, and 2) an increased level of cortisol (released as a stress response to pain) can negatively affect rumen function.

The reduction in milk production caused by lameness varies depending on a number of factors. The point in the lactation in which the case of lameness occurs is critical; if the lameness occurs once peak lactation has passed, the effects on total milk production over the course of the lactation will be less than if the lameness episode occurs before peak. Parity also has an impact; higher parity cows have a greater milk yield and greater reduction in yield as a result. The production potential of the cow is also important; recent research has clearly demonstrated that it is the higher-yielding cows that are at greatest risk of becoming lame. Other important factors include the severity of the lesion (lesions of greater severity will produce a greater reduction in yield), and how early the lameness is identified and treated. Identifying lameness earlier means the lesion will be at a less severe stage when treatment is instigated; cows will recover from lameness more quickly and milk production losses can be minimised.

Considering studies that have reported milk losses over an entire lactation, losses range from 270kg and 574kg. In a recent Irish Teagasc study carried out in 2023, significant milk yield losses of up to 1.6% of the average yield were associated with mobility score (MS) 2 (on a 0-3 scale, with 0 representing normal mobility and 3 representing severely impaired mobility; AHDB 2013), and yield losses of up to 6% were associated with MS 3.

Lameness and Reproductive Performance

Lame cows have reduced fertility for a number of reasons. The pain associated with lameness significantly alters their behaviour and they show less signs of oestrus, making it more difficult for the farmer to detect them in heat. They also eat less, and have longer and deeper periods of negative energy balance; which in turn leads to suppressed reproductive performance. This is seen as lower submission rate to first, delayed ovarian cyclicity, reduced conception rate, increased interval between calving and conception and increased incidence of ovarian cysts. Lame cows also seem to be more prone to uterine infections post-partum and have higher pregnancy losses.

As with milk yield, the timing of the lameness event is critical in determining the extent of reduced reproductive performance: if it occurs later in lactation after the establishment of pregnancy, the effect will be less than if it occurs before first breeding. The effects of lameness on reproductive performance include a mean of 7 days longer time to first service, 30 days increase in days open, 20% lesser conception rate and 1.2 more services per conception. Recent Irish research demonstrated that a MS 2 could increase the calving interval length by 3.5 days, whereas a MS 3 could increase it by 6 days.

Lameness and Culling

Most research shows that lame cows are more likely to be culled. Irish research has found that as mobility score increased, so too did the risk of a cow being culled. A cow with MS 1 was 16% more likely to be culled than a cow with perfect mobility, a cow with MS 2 was almost 50% more likely to be culled, and a cow with MS 3 was nearly 4 times as likely to be culled.

Estimate of Costs for Individual Hoof Conditions

The costs of individual hoof lesions are displayed in Table 1. It can be seen that the majority of costs are indirect in the case of sole ulcers (increased risk of culling and cost of reduced fertility performance), whereas the direct costs are higher for other lesions (cost of treatments; vet and hoof trimmer costs; reduced milk yield). The overall costs of all of these hoof lesions are significant.

Hoof Lesion	Direct Cost (€)	Indirect Cost (€)	Total Cost
Sole Ulcer	237.12 (44.2%)	299.40 (55.8%)	536.52
White Line Disease	128.39 (56.6%)	98.28 (43.4%)	226.67
Digital Dermatitis	133.06 (66.2%)	68.08 (33.8%)	201.14
Foul-in-the-Foot	216.06 (70.1%)	92.08 (29.9%)	308.14



Table 1: Costs of Individual Hoof Lesions in an Irish Context

Herd Cost of Lameness

The costs of lameness calculated for a 100-cow herd, in three different lameness prevalence scenarios, are shown in Table 2. These calculations are for an Irish dairy herd yielding 6000L. The costs can be tailored to each individual herd based on the prevalence of lameness and lesion types identified. Even in a 6000L dairy herd, a high prevalence of lameness could lead to losses of up to €14,000 per year.

Type of Lameness	Digital Dermatitis	White Line Disease	Sole Ulcer	Total Cost
Low Prevalence (%)	5	5	5	
Total cost of a single case	201.14	226.67	536.52	
Low Prevalence Cost for 100 Cow Herd	€1,005.70	€1,133.35	€2,682.60	€4,821.65
Moderate Prevalence (%)	10	10	8	
Total cost of a single case	201.14	226.67	536.52	
Moderate Prevalence Cost for 100 Cow Herd	€2,011.40	€2,266.70	€4,292.16	€8,570.26
High Prevalence (%)	20	20	10	
Total cost of a single case	201.14	226.67	536.52	
High Prevalence Cost for 100 Cow Herd	€4,022.80	€4,533.40	€5,365.20	€14,191.40

Table 2: Modelled Herd Cost of Lameness Cases for 100 Cows/Year

Take Home Message

Lameness is a costly condition and can be a significant source of lost profit for farmers. The other great cost is to the welfare of the cow herself. Taking steps to reduce lameness prevalence within the herd will improve cow welfare and increase farm profitability. For further information on lameness prevention and management, see <https://animalhealthireland.ie/bulletin-cat/hoof-healthcheck-bulletin/> and <https://www.teagasc.ie/publications/2022/red>