Quantification and the Associated Costs of Lameness on Today's Dairies

Charles Guard, *DVM*
Ambulatory & Production Medicine Clinic, Cornell University, Ithaca, NY 14853

Abstract

Quantifying the amount of lameness in a herd requires data from the observations of hoof trimmers, veterinarians and farm workers. The quality and accessibility of this data varies widely across dairies. Opinions and historical recall of past circumstances are of little value in management decisions. The incidence rates for treated cases can be determined from hard data, and are the only reliable means of quantifying herd problems. Three categories of disease, infectious or claw horn lesions or overwear/trauma, are important in formulating control strategies as each occurs from different risk factors. The prevalence of lameness is measured by locomotion scoring. Simple systems that classify cows as lame or not lame are preferred. Prevalence depends on both the incidence and the management of treated cases. Herds with aggressive detection and intervention practices may have low prevalence of lameness regardless of incidence. The financial losses associated with lameness have been estimated for current economic circumstances in the US, and are about $378 per case. Clearly different diseases result in differing costs. Insufficient data has been collected and analyzed to be much more specific in assigning losses to each disease. Sole ulcer and footrot appear to be the most costly common problems, and digital dermatitis the least costly on a per case basis.

Résumé

La quantification du nombre d'animaux boiteux dans un troupeau requiert l'apport d'information par les pareurs d'onglon, les vétérinaires et les travailleurs de la ferme. La qualité et la disponibilité de cette information varient beaucoup d'une ferme laitière à l'autre. En ce qui concerne les décisions de régie, les opinions et les souvenirs ont très peu de valeur. Le taux d'incidence pour les cas traités peut être calculé avec les données sur le terrain et représente la seule mesure fiable pour quantifier le problème dans un troupeau. Trois catégories de maladies, soit les lésions de corne plantaire, les lésions infectieuses et les accidents et l'usure, sont importantes dans la planification des stratégies de contrôle car chacune possède ses propres facteurs de risque. La prévalence de boiterie se mesure par un score de mobilité. Des systèmes qui distinguent simplement les vaches boiteuses des vaches normales sont préférables. La prévalence dépend de l'incidence et de la régie des cas traités. La prévalence de boiterie peut être basse peu importe l'incidence dans les troupeaux qui ont une approche agressive de détection et d'intervention. Les pertes financières associées à la boiterie sont estimées à 378$ par cas dans la conjecture économique actuelle aux États-Unis. Il est bien clair que différentes maladies ont des conséquences différentes. Il n'y a pas assez de données disponibles pour être plus spécifique à l'égard des coûts associés à chaque maladie. Parmi les maladies communes, l'ulcère de la sole et le piétin semblent les plus coûteuses alors que la dermatite digitée semble la moins coûteuse cas par cas.

Quantification

Assessing the magnitude of lameness problems on dairies is harder than asking the owner/manager how much of a problem lameness represents in their herd. Kelton and coworkers suggested that a standardized measure of lameness useful for industry-wide status would be the lactational incidence rate, defined as cows affected at least once with a disorder affecting their gait divided by all lactations at risk.[4] They further suggested that for herd management, a true incidence rate of first cases per 100 cow-days at risk, or total cases per 100 cow-days at risk calculated at monthly intervals, would better serve decision making. Objective incidence data are the best measure and can come from several sources. Data from good herd records created by trimmers and farm workers dealing with lame cows is ideal. Slightly less useful are trimmer records derived from maintenance trims that include incidental observations, often in non-lame cows, of lesions. Recall bias of unrecorded lameness events makes this class of data mostly useless. When nothing else exists, indirect measures might be from inventory turnover of hoof blocks and wraps. Disease records can be usefully categorized into 1) infectious lesions, 2) claw-horn lesions, and 3) overwear, overtrimming, and traumatic lesions. Many lameness experts encourage the recording of extensive details about lesions. In my opinion, for herd management

decisions only the cow identification, date, and category of lesion are needed. For individual cow management, treatments and recheck intervals are important.

Most hoof trimmers generate a list of cows treated during their visit and employ a wide range of categories and details. Often their billing is dependent on this record, so it is geared to treatments rather than lesions. However, wraps are usually used for infectious problems and blocks for claw-horn lesions. Farm employees doing lame cow treatment generally have less standardized systems for recording their observations and work, thus making summarization and interpretation harder. Lameness data has much more value if the individual cow lesion records are added to the herd management software. Having the data already in Dairy Comp 305 or similar systems makes the who, what and when of analyses much simpler.

Prevalence is a second measure of the magnitude, and perhaps the management, of lame cows. Locomotion scoring is the only current tool to create this data. The situation is dynamic in most herds, with incident cases being treated or sold and new cases occurring. Since the prevalence is a function of both incidence and the duration of lameness, it may capture the herd's response to lameness better than incidence. Locomotion scoring does not readily allow classification of the causes of the problem, and is thus less useful for modifying control strategies. Most farms do not routinely perform locomotion scoring, but it has been used extensively in research. For large herds where the time commitment to score the entire herd may not seem justified, it is better to score entire pens than a convenience sample. Behavior patterns, including milking order and movement within a pen, make the convenience sample in these circumstances very likely to be biased.

Locomotion scoring is most conveniently done for cows exiting the milking parlor. There are several systems described in the literature, but most are condensed to not lame, moderately lame, and severely lame, or to not lame and lame. For an assessment of current herd circumstances it is not necessary to link a cow identity to the score, but rather to characterize the population as the proportion in each lameness category. In a recent project we found that the sensitivity of locomotion scoring was about 80% for painful digital lesions, and about 98% specific.

Estimating and Assigning Costs to Lameness

Lameness, like other disease conditions, leads to herd costs through death, premature replacement, milk production loss, delayed conception and treatment costs. In several observational studies during the last 15 years we have collected data to estimate these categories of loss.[1,7] The magnitude of risk for any of the loss categories varies with the causative condition. Despite this obvious relationship, good data on the losses due to each disease entity are incomplete at this time. Existing data does indicate that the losses due to footrot are much higher per case than for digital or interdigital dermatitis. Likewise, losses due to sole ulcer are greater than those due to white-line diseases.

Death is usually not directly due to lameness of the digit, but some cows are unfit for slaughter as non-ambulatory. In commercial freestall dairies in the northeastern US, about 2% of lameness, cases result in death or euthanasia. Premature replacement is a clear hazard of lameness, but more difficult to quantify. The risk for culling of lame cows is about twice that of non-lame cows in the lactation when lameness is identified.[1] How much productive life, and therefore profit, is lost by premature replacement? Reproductive inefficiency affects cows that are lame during early lactation. In Pennsylvania herds, cows lame before breeding had 28 extra days open.[5] In a pair of Florida studies, cows lame in the first 100 days of lactation had an increase of 36 to 60 days open over non-lame herdmates[3] and for cows lame in the first 30 days of lactation the first-service conception rate was 18%, versus 43% for non-lame herdmates.[6] The milk production loss due to clinical lameness due to all causes was estimated at 792 lb (360 kg) in the UK.[2] In our studies, milk production in lame cows with any diagnosis was significantly different from normal herdmates about two weeks prior to diagnosis, and persisted to the end of lactation.[7] For cows with digital dermatitis, the difference was small (less than 1 lb [0.45 kg] / day) and did not persist beyond three weeks. Footrot and sole ulcer caused the most severe production losses.

The following table summarizes the values of each category of cost for an average case of lameness. Values for the milk loss and extra days open are from the combined results of previously cited reports. The proportion of cows who are not saleable and either die or are euthanized come from my analyses of local herd records representing about 10,000 lactations. The proportion of lame cows culled is an extrapolation of the relative risk of culling from our studies already cited.

It is clear that the premature replacement of lame cows in dairy herds is the single largest category of cost. Please appreciate that all the data used in these analyses come from cases of lameness that were identified and treated. For herds that are less vigilant than those of the many herds contributing to these data, the losses per case would be expected to be higher. These cost estimates are certainly imperfect and are influenced by the price of replacements, cull cow value and the market price of milk. Despite their limitations, the general magnitude is correct across the populations of dairy cattle in North America. Several authors have identi-

Table 1. Calculation of average case cost of lameness.

	Amount lost	Value in US dollars
Death	2% — replacement cost $2000	40
Culling	12% — replacement – cull $2000-$500	180
Milk loss	790 lb milk — marginal profit of $0.09/lb	71
Reproduction	20 extra days open — $3 / day	60
Treatment	0.5 hr labor + trimmer fee + supplies	27
	Total	$ 378

fied that some diseases have a more severe impact than others. In our studies, sole ulcer and footrot were the most costly, and digital dermatitis the least costly, on a per-case basis. Accurate estimates of the impacts and costs of each category of lameness await further data collection and analyses.

References

1. Booth CJ, Warnick LD, Grohn YT, Maizon DO, Guard CL, Janssen D: Effect of lameness on culling in dairy cows. *J Dairy Sci* 87:4115-4122, 2004.
2. Green LE, Hedges VJ, Schukken YH, Blowey RW, Packington AJ: The impact of clinical lameness on the milk yield of dairy cows. *J Dairy Sci* 85:2250-2256, 2002.
3. Hernandez JAA, Garbarino EJ, Shearer JK, Risco CA, Thatcher WW: Comparison of milk yield in dairy cows with different degrees of lameness. *J Am Vet Med Assoc* 227:1292-1296, 2005.
4. Kelton DF, Lissemore KD, Martin RE: Recommendations for recording and calculating the incidence of selected clinical diseases of dairy cattle. *J Dairy Sci* 81:2502-2509, 1998.
5. Lee LA, Ferguson JD, Galligan DT: Effect of disease on days open assessed by survival analysis. *J Dairy Sci* 72:1020-1026, 1989.
6. Melendez P, Bartolome J, Archbald LF, Donovan A: The association between lameness, ovarian cysts and fertility in lactating dairy cows. *Therio* 59:927-937, 2003.
7. Warnick LD, Janssen D, Guard CL, Grohn YT: The effect of lameness on milk production in dairy cows. *J Dairy Sci* 84:1988-1997, 2001.