Benchmarking lameness and skin injuries: Engaging producers and improving practice

Marina A. G. von Keyserlingk and Daniel. M. Weary

Animal Welfare Program, Faculty of Land and Food Systems, University of British Columbia, Vancouver, Canada, marina.vonkeyserlingk@ubc.ca and/or dan.weary@ubc.ca

The Problem

Lameness is now recognized as of the most prevalent and costly maladies affecting the dairy industry today (Bruijnis et al., 2013; Chapinal et al., 2013). Although we are slowly becoming aware of how prevalent lameness (cows showing noticeable weight transfer off the affected limb) is on dairy farms in many parts of the world (Austria, Canada, China, Finland, Germany, Italy, Netherlands, New Zealand, Norway, UK and the US (e.g. Amory et al., 2006; Barker et al., 2010; Chapinal et al., 2014a; Dippel et al., 2009; Fabian et al., 2014; Kielland et al., 2009; Popescu et al., 2014; Sarjokari et al., 2013; von Keyserlingk et al., 2012) little is known about the prevalence of lameness in other parts of the world (e.g. South America, Eastern Europe or the Middle East). Collectively the available work to date indicates higher prevalence's in zero grazing (intensive) systems, averaging about 25%, with a trend toward lower prevalence in grazing systems (e.g. 8% in New Zealand; Fabian et al., 2014).

Regardless of the lameness prevalence in a particular region it appears that dairy producers tend to underestimate the amount of lameness in their herds (United Kingdom, Whay et al., 2002; USA, Espejo et al., 2006; New Zealand, Fabian et al., 2014). Recent reports in the US show that despite lameness being accepted as the primary welfare concern facing farmers, current methods of intervention to reduce the risk for lameness are lagging (e.g. von Keyserlingk et al. 2012). The problem therefore appears two fold: firstly, farmers routinely underestimate lameness on their farms and secondly, tremendous variation exists between and within regions and countries as well as between production systems (see von Keyserlingk et al., 2012). We suggest that tailored solutions will likely work best if we are to try and reduce lameness prevalence. The first objective of this conference proceeding chapter is to firstly describe how benchmarking lameness and skin injuries has proven useful in reducing lameness prevalence. Our second objective is to show how working with farmers in this manner provides rich datasets that allow for risk factor analyses that help identify solutions to lameness (and injuries) on dairy farms.

Individual farms - tailored solutions and the role of benchmarking

The issue of cow comfort, and how it relates to the risk of lameness and injuries, has received considerable interest. Factors related to how the facilities are designed and managed may influence cow's behaviour. The University of British Columbia developed and piloted a program focused on assessing lameness on farms in British Columbia (Ito et al., 2010) and this has now expanded onto

farms in Eastern and Western USA (see von Keyserlingk et al., 2012) and China (Chapinal et al., 2014). The results have been used to benchmark farms relative to peers in the same region. Benchmarking compares farms 'like-with-like' and helps to identify areas of underperformance relative to the best performers in the industry. To date, these studies have focused primarily on the high production lactating cows in intensively housed systems located in western Canada and some US states (e.g. California, Vermont, New York, and Pennsylvania).

One of the most interesting findings of our work was that some farms were able to achieve extremely low levels of lameness whereas others were challenged in this area – have lameness rates well in excess of global average of 25% cited above (see von Keyserlingk et al., 2012), In Figure 1 we show our findings from our work summarizing our visits to 121 farms visited in British Columbia (BC), California (CA) and the North Eastern United States. You will see that the prevalence of clinical lameness averaged 28%, 31% and 55% respectively in these regions. The rates of severe lameness were considerably lower but equally worrisome as these are far more likely to be associated with pain (see companion proceedings chapter by Weary and von Keyserlingk); the prevalence of severe lameness averaged 7% in BC, 4% in CA, and 8% in NE.

Benchmarking – providing dairy farmers with their own evidence

What has become clear to us is that by providing farmers 'benchmarking'information we are able to facilitate conversations between the various stakeholders involved in caring for cows on a particular farm. At each visit we provided each farmer with a confidential report that they could used as a vehicle for discussion (ideally together with the farm workers involved in caring for the cows, the herd veterinarian, hoof trimmer and nutritionist and any other consultants involved in the day to day care of the animals) to develop evidence based changes in management practices to address the challenges presented in the report. By providing farmers with the report, together with averages from other farms in their region, they are able to identify areas of success on their farm and areas where work was still needed.

As an example we have provided the prevalence data we collected in British Columbia and the US (see Figure 1). As you can see there is variation within a region, some farms doing an outstanding job where as others are struggling with high rates of lameness. Once provided the information farmers are then able to make evidence based decisions and also to reflect on their industry as a whole. For instance, the farm in California that had the lowest prevalence of lameness (~5%) immediately asked what he needed to do in order to reduce this to zero. He also quietly stated that the fact that some farms had a prevalence in excess of 60% were a challenge for the dairy industry as a whole. In contrast, when visiting one of the farms that had ~60% lameness prevalence the farmer was extremely concerned and was motivated to try and find a solution.

Unlike alterations in locomotion which farmers struggle to identify without training (Endres et al., 2006), hock lesions are easily identified in the milking parlour. Injuries on cattle are

normally associated when the animals come into physical contact with aspects of the housing environment, with abrasions on the knees and hocks the most common. These injuries can be as small as hair loss the size of a coin to swelling and open wounds that range from small to large (see companion proceedings paper on cow comfort assessment).

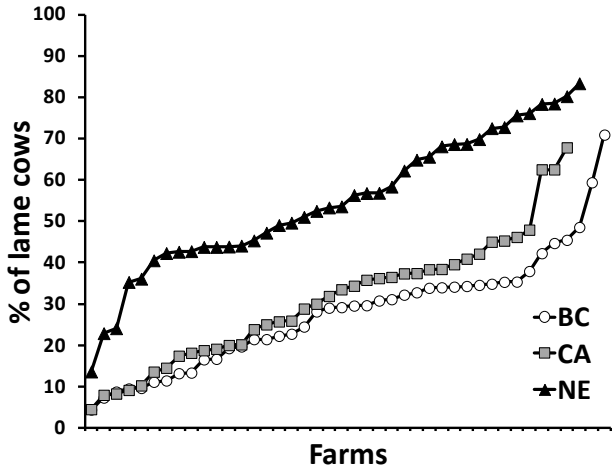


Figure 1.Clinical lameness in British Columbia (BC), California (CA) and the North Eastern US (NE); farms are ranked lowest to highest (from von Keyserlingk et al., 2012)

In our study (described in von Keyserlingk et al., 2012) cows on each farm were scored for hock condition (lateral surface of the tarsal joint) on a 3-point scoring system developed initially by Cornell University; where 1 =healthy hock, 2=bald area on the hock without evident swelling, and 3=evidently swollen and/or severe injury. During our study we recorded the % of cows scored with a visible hock injury (i.e. score = 2) and % with severe injury (hock scored = 3). As you can see from the data presented in Figure 2 the prevalence of hock injuries varied tremendously among regions, from 42% in BC, to 56% in CA, to 81% in NE. Although far less prevalent, we are also especially concerned with severe hock injuries which ranged from 2% in CA to 5% in NE, with BC intermediate. Although it is concerning that these injuries are so prevalent on some farms in each of the regions, equally promising is that in every region some producers were able to achieve good levels of success in keeping the % of cows affected low.

Cows in CA and the NE were also recorded for swollen knees (carpal joint) (Figure 3); injuries were recorded as present (evidently swollen joint with or without skin damage) or absent. This injury was rarely observed (less than 1% of cows affected) in CA, but unfortunately swollen knees were relatively common (23% mean prevalence) in NE (von Keyserlingk et al., 2012).

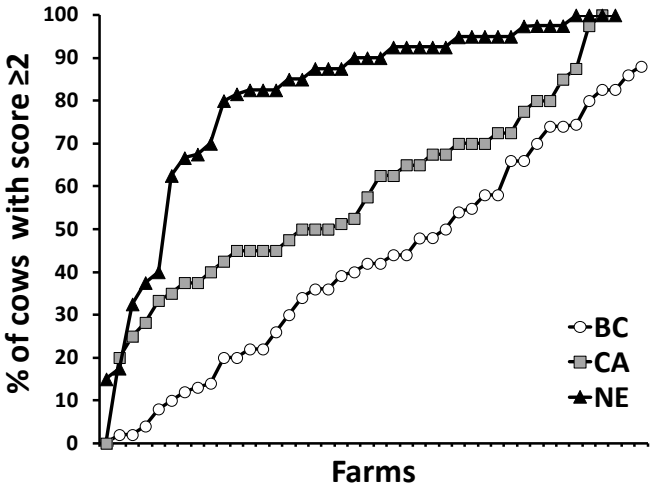
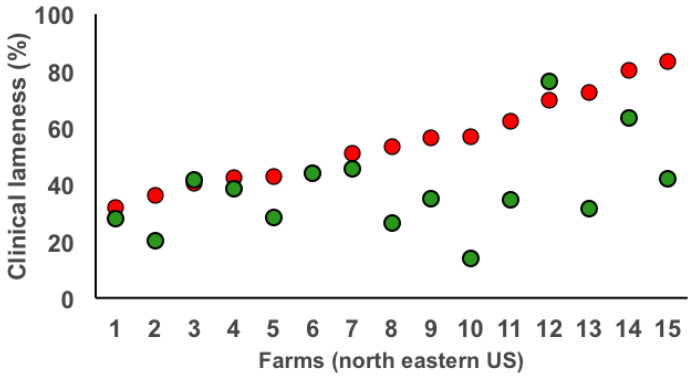


Figure 2. Hock injuries on farms in British Columbia (BC), California (CA) and North Eastern US (NE); farms are ranked from lowest to highest (see von Keyserlingk et al., 2012).

Figure 3. A lactating Holstein cow identified as having a swollen knee (photo credit UBC Animal Welfare Program).

Our ultimate goal is to motivate farmers to address the measures that are shown to be a challenge for them during the benchmarking process. To date we have only completed one study that addresses this issue. We were given the opportunity to return to farms in the NE region of the United States that had taken part in our previous benchmarking study summarized by von Keyserlingk et al., (2102). Please note that this was a convenience sample, as the farmers we visited in this study had asked that we come back to provide them with update information and thus they were likely highly motivated to reduce lameness and hock injuries on their farms. Lameness rates improved on 13 of the 15 farms included in this study, with prevalence often reducing more thatn 10% (Chapinal et al., 2014; see Figure 4a). Even more impressive still was the improvement in hock lesions (Figure 4b) where almost all farms improved. Collectively, our work undertaken to date suggests that the benchmarking process should be approached as an iterative process: the initial assessment followed by tailored changes on a farm, and then followed by a re-assessment, followed by new changes, etc., allowing farmers to make decisions on what works best on their farm, evaluation of their implemented changes and then evidence of how well their changes meet their management goals.

A)



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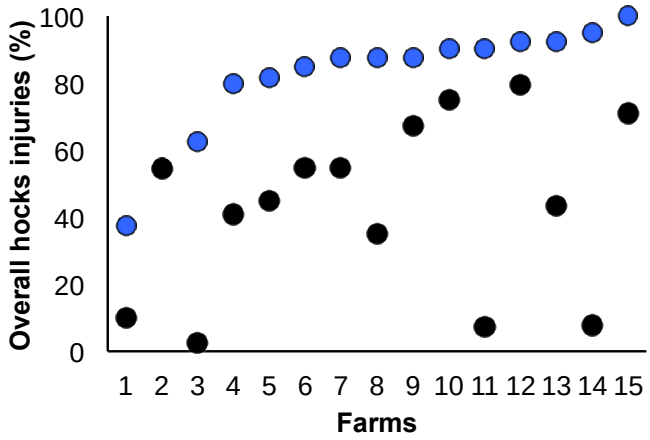

Figure 3.Prevalence (%) of A) clinical lameness and B) clinical hock injuries in 15 freestall herds in Northeastern United States in two consecutive farm assessments. Green (Panel A) and black (Panel B) circles designate the first assessment for lameness and hock injuries, respectively. Farms are sorted by prevalence at the first assessment (see Chapinal et al., 2014b)

Risk Factor Analyses

Our second objective with this on farm work is to use the data to identify risks for lameness and lesions. We are able to do this within different regions. For example, in British Columbia we found that the mean prevalence of severe lameness (gait score 4 or 5; Flower and Weary 2006) was higher on farms where cows were on mattresses (9% of cows severely lame) versus farms that using deep-bedded cubicles (4% of cows severely lame) (Ito et al., 2010). In the north eastern United States, where many farms used mats or mattresses with little bedding, the occurrence of lameness was reduced by half on farms using deep bedding or providing dry cows access to pasture (Chapinal et al., 2013). In California, all farms used deep-bedded cubicles and almost all farms provided outdoor access (typically to a well-bedded dry lot). Likely because of these conditions, rates of severe lameness were much lower in this region (Chapinal et al., 2013). Within the California farms, lameness was lowest on farms where cubicles were kept clean (i.e. not contaminated with feces) and on farms

that used rubber in the alley leading to the milking parlor. These results illustrate that when farmers work towards eliminating one risk factor (e.g. by changing from mattresses to deep bedding) new limiting factors are identified (such as the benefits of rubber flooring; Chapinal et al., 2013).

We also saw similar regional differences in risk factors associated with hock injuries. For instance in the NE, our work indicates that farms that provide cows with stalls that are deep-bedded and clean as well as providing access to pasture during the dry period are associated with lower prevalence of hock injuries. Our analyses also indicated that the use of a manure removal method other than automatic scrapers is important protective factor in this region. Interestingly, in CA where we all farms visited made use of deep bedding, we saw lower prevalence on farms with better stall management and those that did not overstock.

Conclusions

Benchmarking is a powerful method for promoting the adoption of practices that result in improved dairy cattle welfare (von Keyserlingk et al., 2012). This process involves providing individual farms with data from their own farm and averages from other farms in their region. Producers are provided confidential benchmarking reports that they and their advisors can use to make better-informed decisions on management practices and develop tailored strategies for improving the care and management of cattle on their farm. Equally important is the data set that emerges from this exercise, allowing researchers to identify practices and farm design features associated with high levels of success.

Acknowledgments

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