Lameness and Leg Injuries in Open Lot Dairies in Southwestern United States

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INTRODUCTION

Producers spend millions of dollars building housing for dairy cattle, with the aim of providing a comfortable environment for their animals. Unfortunately, this housing does not always function well from the perspective of the cow – poorly designed and maintained facilities can cause injuries, increase the risk of lameness and other diseases and compromise welfare (von Keyserlingk et al., 2009).

Intensification of dairy production in North America has given rise to modern housing systems intended to maximize efficiency. During the last 50 yr, types of housing on US dairies have changed from predominantly stanchion and tie-stall operations to freestalls and open lots (USDA, 2010). The last National Animal Health Monitoring System survey showed that 18 % of the lactating cows and 37 % of the dry cows were housed in open lots, making this type of facility the second most common, after freestalls (USDA, 2010). However, until now most farm surveys and cow comfort research have focused on freestalls, such that there is a lack of science-based guidance for open-lot dairies.

Benchmarking can be used to promote the adoption of best practices on dairy farms (von Keyserlingk et al., 2012). Over the past few years our group has visited hundreds of farms throughout North America, benchmarking measures related to cow comfort (e.g. lameness and leg injuries) and measures of how the facilities were designed and managed (freestall: e.g. stall dimensions, bedding practices, and stocking density). Some of this work has also focused on open lot dairies, recording practices such as bedding management, shade availability, and stocking density. The primary aim of this work has been to provide the participating dairy farmers with data from their own farm, together with data from other farms in their region, so they can identify areas of success and areas where work was still needed on their farm. Each farmer is provided with a confidential report that they can use (together with their farm staff, veterinarian, hoof trimmer, and nutritionist) to develop tailored solutions for their own farm.

LAMENESS PREVALENCE

We have found immense variation in the prevalence of lameness. For example, the prevalence of clinical lameness on freestall farms averaged 28 % in British Columbia (**BC**), 31 % in California (**CA**), 55 % in the northeastern United States (New York, Pennsylvania, and Vermont; **NE-US**) (von Keyserlingk et al., 2012). This compares with a 32 % prevalence for the 35 open lot dairies we visited in the Southwest United States (New Mexico and the Texas Panhandle; **SW–US**). Similarly, prevalence of severe lameness in freestalls averaged 7 % in BC, 4 % in CA, 8 % in NE – US, versus 2 % in open lots in SW – US (Figure 1).

Variation in lameness rates can be explained in part by how the facilities are designed and managed; but these factors vary greatly among regions due to differences in tradition, barn builders, and availability of materials such as bedding. This means that the factors associated with

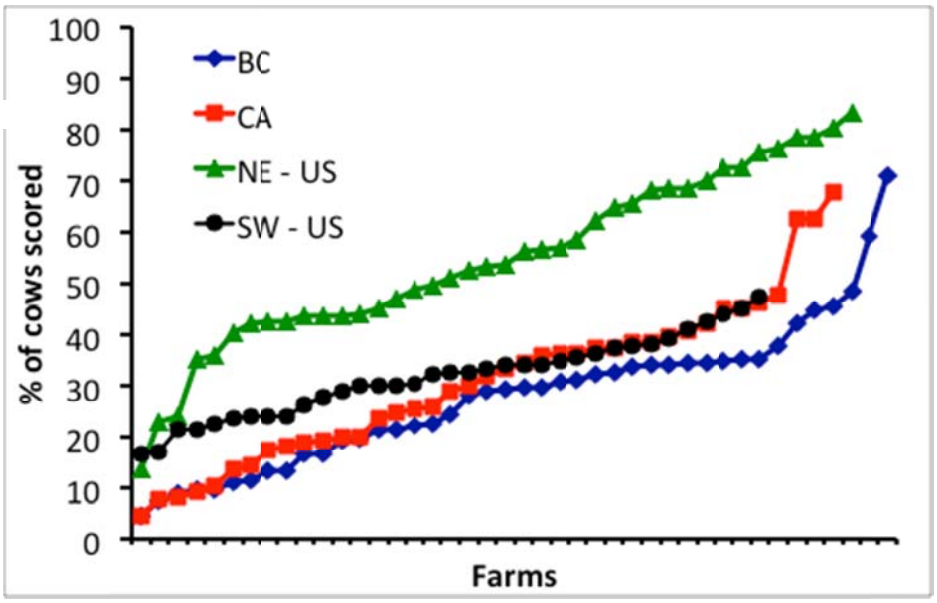

Figure 1. Distributions of the prevalence of the clinical lameness (numerical rating score (**NRS**) ≥ 3) across the high production group assessed on freestall farms in British Columbia (BC), California (CA), and northeastern US (NE - US); and open lots in southwestern US (SW – US) (adapted in part from von Keyserlingk et al., 2012).

lameness also vary among regions. For example, in recent analyses we have found major differences in factors associated with lameness in freestall facilities between the NE – US versus CA (Chapinal et al., 2013). In the NE – US, where many farms used mats or mattresses with just a little sawdust bedding, the risk of lameness was reduced by half for farms using deep bedding and for farms that provided some access to pasture during the dry period. In CA, all farms used deep-bedded stalls (typically with dry manure bedding) and almost all farms provided outdoor access (typically to a well bedded dirt yard). Under these conditions, rates of lameness were much lower than in the NE – US. Within the California farms rates of lameness were lowest on farms where stalls were kept clean (i.e. not contaminated with feces) and on farms that used rubber in the alley to the milking parlor.

We found somewhat less variation in rates of lameness in open lot dairies in the Southeast (ranged from 17 to 47 %). This reduced variation may be due to more uniform design and management conditions on these farms. All of the farms visited provided the high producing group we assessed a large dirt corral. Although there was no extra bedding provided cows did have access to a shaded area and water troughs. On nearly all farms we observed a concrete apron at the feed bunk. Farm size average was approximately 3000 milking cows, ranged from 1111 to 5548 cows. The number of cows in the high producing group assessed averaged 286, ranging from 97 to 436. Farms were on average 12 yr old, but ranged from 2 to 33 yr. The total space available per cow was 59 m^2 and ranged from 42 to 74 m^2. The concrete apron width at the feed bunk averaged 4 m, ranging from 3 to 4 m. Feed bunk stocking density (based on 60 cm/cow) averaged 95 %, ranging from

75 to 110 %. Water lineal space per cow averaged 9 cm/cow, ranging from 4 to 17 cm. The area under the shade available per cow was in average 3 m^2 and ranged from 2 to 7 m^2. Twenty-two out of the 35 farms also provided their cows with a structure to protect them from wind; the area available per cow averaged 7 m^2, and ranged from 3 to 16 m^2. We found that cows in this region walked long distances to get to and from the milking parlor, averaging 494 m with the shortest distance being 116 m and the longest 1795 m. On many farms cows spent long periods outside of the pen waiting to be milked; on average more than 4 h/d (246 min/d) and ranged from 134 to 399 min/d.

Measuring lameness takes some time and effort. Most people with cow experience can correctly identify animals that are severely lame; but identifying clinically lame animals requires some training, much like body condition scoring of cattle. One of the broad messages from our work is how much value producers can gain from getting information for their farms. We can provide this service for farms we have visited, but ultimately more farmers and farm workers need to become competent at gait scoring – you can't manage for lameness unless you can measure it!

We know from a series of previous studies, including work done in British Columbia more than a decade ago, that rates of hock injuries can be greatly reduced by using deep bedding and that rates of lesions are higher on farms using poorly bedded surfaces like mats and mattresses (Weary and Taszkun, 2000). This effect likely explains why lesions are so common in the NE-US where poorly bedded surfaces are the norm.

HOCK INJURY PREVALENCE

Unlike lameness, hock lesions are obvious to anyone who cares to look. Indeed, it is pretty hard to avoid noticing hock lesions when you are standing at hock level in the milking parlor. But even though we can see these lesions they remain common on many farms. Again, we found that prevalence varied among regions, from

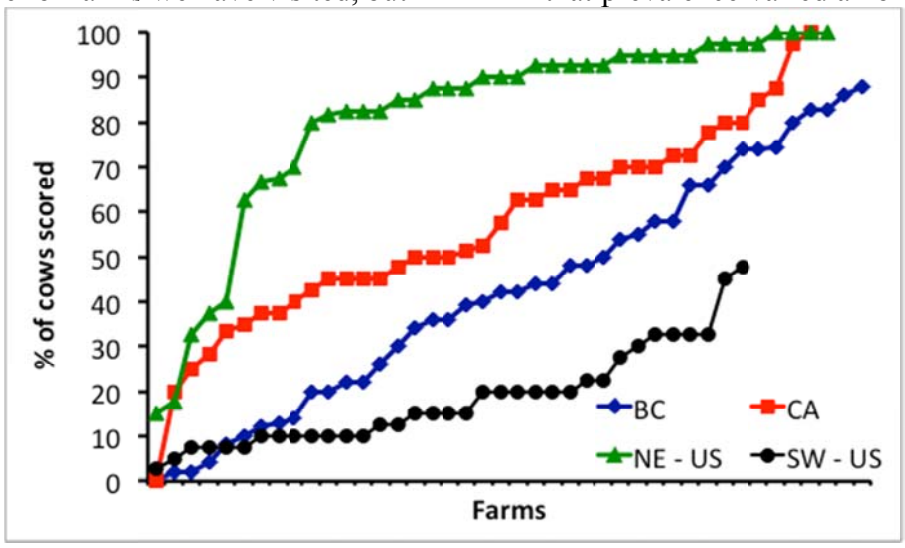

Figure 2. Distributions of the prevalence of hock injuries across the high production group assessed on freestall farms in British Columbia (BC), California (CA), Northeastern US (NE - US); and dry lots in southwestern US (SW – US) (adapted in part from von Keyserlingk et al., 2012).

42 % in BC, to 56 % in CA, to 81 % in NE – US and 18 % in SW – US (Figure 2). And again, the good news is that within each region some farms had very low rates suggesting that others could learn from these most successful producers.

Our more recent work has shown that hock injuries in high producing dairy cows varied in relation to design and management of freestall barns in 2 regions of USA. In NE-US (New York, Vermont and Pennsylvania), use of deep-bedded stalls, clean bedding, access to pasture, and avoiding the use of automatic scrapers for manure removal reduced hock injuries. In California (where all the herds assessed used deep bedding), injuries were less common on farms with better stall management (Barrientos et al., 2013). Many of the open lot dairies achieved a low prevalence for hock lesions, but on some farms more than 20 % of cows had these lesions. It is not clear what factors on these farms were resulting in the higher rates of lesions; we encourage more research to identify the risk factors at play.

CONCLUSIONS

In summary, benchmarking programs, like the one we described here, provide farmers the relevant data from their farms and other farms in their region. Farmers can use this data, together with the recommendations described here and elsewhere, to formulate tailor-made solutions to problems with lameness and leg injuries. We view customized solutions as essential, given the different challenges and opportunities faced by different farms.

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LITERATURE CITED

Barrientos, A.C., N. Chapinal, D.M. Weary, E. Galo, and M.A.G. von Keyserlingk. 2013. Herd-level risk factors for hock injuries in freestall housed dairy cows in the Northeastern US and California. J. Dairy Sci. 96:3758–3765.

Chapinal, N., A. Barrientos, M.A.G. von Keyserlingk, E. Galo, and D.M. Weary. 2013. Herd-level risk factors for lameness in freestall farms in North Eastern US and California. J. Dairy Sci. 96:318-328.

USDA. 2010. Facility Characteristics and Cow Comfort on U.S. Dairy Operations, 2007, December. USDA:APHIS:VS:CEAH.#524.1210.

http://www.aphis.usda.gov/animal_health/nahms/dairy/downloads/dairy07/Dairy07_ir_Facilities.pdf Accessed on Feb 6, 2014.

von Keyserlingk, M.A.G., A. Barrientos, K. Ito, E. Galo, and D.M. Weary. 2012. Benchmarking North American Freestall Dairies: Effects of lameness, injuries, facility and management for high producing Holstein dairy cows. J. Dairy Sci. 95:7399-7408

von Keyserlingk, M.A.G., J. Rushen, A.M.B. de Passillé, and D.M. Weary. 2009. Invited review: The welfare of dairy cattle – Key concepts and the role of science. J. Dairy Sci. 92:4101-4111.

Weary, D.M., and I. Taszkun. 2000. Hock lesions and free-stall design. J. Dairy Sci. 83:697–702.