

Lameness in the Dairy Industry: Improving Detection to Reduce Prevalence

A review of the efficacy of current techniques for detecting lameness in dairy cattle, and a technique that could improve detection accuracy and reduce prevalence.

By Bethany Anderson

Word count: 975

Introduction

Lameness, the clinical presentation of impaired locomotion and mobility (Archer *et al.*, 2010) is currently considered the most important animal-welfare issue in the dairy industry (Logue & Mayne, 2014; Ventura *et al.*, 2015). Despite this, lameness is usually not formally assessed on dairy farms, and staff typically underestimate its prevalence. When lameness is independently assessed and farmers are given comparative figures from nearby properties, measures can be taken to lower the prevalence of lameness. This demonstrates the importance of identifying factors that increase farmers' uptake of strategies to improve animal welfare. Statistical analysis of routinely collected data to predict lameness in individual animals could be a practical and economically viable way of improving animal welfare in the dairy industry.

Discussion

Several systems of gait scoring for detection of lameness are currently available to farmers, all of which require staff training but no special equipment. Despite this, a recent study of New Zealand dairy farms (Fabian *et al.*, 2014) found that farmers commonly underestimate lameness. The study aimed to compare measured lameness against the farm manager's perception of the level of lameness in the herd.

Researchers assessed lameness using the DairyCo mobility score, a system designed for practical on-farm use, which forms the basis of the industry-recommended DairyNZ lameness score. Across 59 properties, the system identified lameness in 1.2-36% of each herd (mean 8.1%). However, when surveyed, farmer estimates of lameness on their properties ranged from 0-20% (mean 2.2%), meaning that in each herd, on average only 27.3% of lame cattle were correctly identified. [Farm selection in this study was based on local veterinary recommendations, so may not be representative of all farms across New Zealand.] However, this study is the largest yet undertaken into the prevalence of lameness in the southern hemisphere, which farms dairy cattle under conditions very different from those in the northern hemisphere. These results demonstrate that, despite industry recommendations, current systems for the detection of lameness are underestimating lameness events, and are therefore compromising animal welfare.

In North America, Chapinal *et al.* (2014) reported reductions in the prevalence of lameness on farms that received a customised report detailing lameness prevalence on the focal property in comparison to that measured on other farms in the region. Chapinal *et al.* (2014) initially provided lameness assessment by gait scoring to 50 properties; of these, 15 farms requested a second lameness assessment. On average 11.5 months passed between assessments, and at the second assessment, properties had on average a 17% reduction in lameness events compared to their first assessment. This study relied upon producers requesting a second assessment, so probably describes only those properties where lameness detection and treatment were a priority. Regardless, it indicates that mobility scoring for lameness can motivate farmers to achieve significant improvements in dealing with lameness events. It therefore prompts the question, why are farmers underestimating the prevalence of lameness in their herds?

A survey of farmers conducted by Horseman *et al.* (2014) aimed to uncover factors that influence farmers when making changes on their property. Through interviews with producers, the researchers found that many farmers viewed regular formal mobility scoring as unnecessary, as they felt they were able to visually assess lameness adequately during daily contact with their animals. Farmers who were able to see the benefits of a structured mobility scoring program, particularly with an external assessor, expressed concerns regarding the practicality of running such a program on their property, including finding an appropriate person to carry out the scoring, and finding time for the practice in their busy schedules. This research shows the importance of considering producer opinion when devising any strategy for welfare improvement in production animals. It also shows that any system to improve monitoring of lameness in dairy cattle must easily integrate into, and should ideally improve, the farmer's daily farm operations.

Globally, the average size of dairy herds and the uptake of automated milking systems are increasing (Molfino *et al.*, 2014). As such, opportunities for farmers to visually assess lameness on a day-to-day basis

are in decline. A method for the detection of lameness that does not require direct visual contact with the animals will be critical to the welfare of future herds. However, the best route for improvement of lameness monitoring (and, thus, animal welfare) may not be the development of one single lameness assessment tool. Biological systems are inherently highly variable. The most successful approach will be one that utilises this variation to make predictions about health status in individual animals.

Recently, statistical programs have been developed that aim to bring together the abundant information gathered during milking on modern dairy farms. One study, which examines the use of statistical modelling in dairy farms, is that by Garcia *et al.* (2014). The study aimed to detect lameness based on production and behavioural data, such as average milk flow, activity measurements (recorded by accelerometers on neck collars), and amount of concentrate consumed at milking. Based on changes in these variables, the statistical model was able to classify individual cows as either lame or non-lame with a sensitivity and specificity score of 85 and 88 per cent, respectively. These figures matched, or bettered, the reported ranges for sensitivities and specificities of detectors designed specifically for detecting lameness.

Conclusion

Despite industry agreement that lameness is the major current animal-welfare issue for dairy cattle, farmers typically underestimate its prevalence within their own herds. Once aware of the prevalence of lameness on their property, farmers are capable of reducing it. However, while mobility scoring can be used effectively to assess prevalence, farmer surveys indicate that there are several factors limiting its uptake. Recent research demonstrates the power of statistical modelling for the indirect detection of lameness using readily measured parameters, and should be considered as part of the strategy for the dairy industry to address its major animal-welfare concern.

References

- Archer, S., Bell, N., Huxley, J. 2010. Lameness in UK dairy cows: a review of the current status. *In Practice*, 32:10, 492-502.
- Chapinal, N., Weary, D.M., Collings, L., Keyserlingk, M.A.G. 2014. Lameness and hock injuries improve on farms participating in an assessment program. *The Veterinary Journal*, 202:3, 646-648.
- Fabian, J., Laven, R.A., Whay, H.R. 2014. The prevalence of lameness on New Zealand dairy farms: A comparison of farmer estimate and locomotion scoring. *The Veterinary Journal*, 201:1, 31-38.
- Garcia, E., Klaas, I., Amigo, J.M., Bro, R., Enevoldsen, C. 2014. Lameness detection challenges in automated milking systems addressed with partial least squares discriminant analysis. *Journal of Dairy Science*, 97:12, 7476-7486.
- Horseman, S.V., Roe, E.J., Huxley, J.N., Bell, N.J., Mason, C.S., Whay, H.R. 2014. The use of in-depth interviews to understand the process of treating lame dairy cows from the farmer's perspective. *Animal Welfare*, 23:2, 157-165.
- Logue, D.N. & C. S Mayne 2014. Welfare positive management and nutrition for the dairy herd: A European perspective. *The Veterinary Journal*, 199:1, 31-38.
- Molfino, J., Kerrisk, K., Garcia, S.C. 2014. Investigation into the labour and lifestyle impacts of automatic milking systems (AMS) on commercial farms in Australia. Proceedings of the 5th Australian Dairy Science Symposium 2014 339-342 Available from http://www.futuredairy.com.au/Scientific_Publications.php.
- Ventura, B.A., von Keyserlingk, M.A.G., Weary, D.M. 2015. Animal welfare concerns and values of stakeholders within the dairy industry. *Journal of Agricultural and environmental ethics*, 28, 109-126.