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Update on Lameness Research

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Lameness is now identified as the most common malady of dairy cows. Much of the current research at the UBC Dairy Research Centre relates to lameness and ways of preventing injuries leading to lameness by designing better environments and management strategies for dairy cattle. This year's BC Dairy Expo will focus on this important and costly problem for dairy farmers and their cows. At this meeting, researchers from the UBC Dairy Research Centre, along with invited guests, will host a workshop on improving methods for identifying injuries and gait abnormalities, and provide an update on the recent and on-going research projects in this area. For those of you who are not able to attend this event, here is a brief overview of our work in this area, together with some key findings and recommendations.

Assessing lameness

Although lameness is commonly recognized as a major problem faced by dairy cattle, there has been almost no work on describing the problem in BC, and little research on developing more accurate tools for identifying lame cows. Cows become lame as a result of injuries and diseases of the hooves and legs. In this article, we summarize data on prevalence of hoof injuries, describe work looking at changes in gait and report on recent research findings about facility design and management that may help prevent lameness.

Sole lesions are signs of tissue damage in the hoof and can range in severity from minor bruising to severe ulcers. M.Sc. student Erin Bell measured lesions in 20 local herds and found that 86% of the cows had at least one hoof lesion (see Research Reports Vol. 2, No. 2). Lesions can be assessed easily at hoof trimming.

Sometimes a direct assessment of injuries will not be possible, for example, between scheduled visits by the hoof trimmer. In these cases we need to look for other, indirect signs of the problem. We all have some understanding of the obvious changes in the way cows walk when they are lame – a reluctance to bear weight on one limb, an arched back, bobbing of the head and short strides. When these signs are exaggerated or combined, most of us would be able to recognize a cow as lame, but what about when these changes are subtle? Many of us do not do well in picking out these cows.

One study found that producers were able to identify only one out of every four clinically lame cows. Clearly, work is needed to improve our assessment techniques. Gait scoring methods, similar to body condition scoring, provide ways of not just picking out the severely lame cows but also the intermediate cases. Those interested in learning these scoring systems should attend one of our workshops or speak to their vet.

To improve treatment and prevention, work with your vet to develop ways of tracking hoof lesions and gait defects on your farm.

More sensitive methods of assessment may allow us to learn more about preventing and treating lameness at an early stage. One recent innovation is the work of Ph.D. student Frances Flower who is using computer-assisted video analysis to quantify gait measures such as stride length and hoof velocity. Another approach, by M.Sc. student Sophie Neveux, is using load cells to measure how cows favour certain legs when standing. We have also used measures of standing and lying behaviour as indicators of injury. Frances Flower has found that cows that

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spend more than 10% of their time standing with only their front two hooves in the stall are more likely to have hoof injuries.

Preventing lameness

Standing on concrete flooring increases the risk of hoof lesions and lameness, especially if the surface is wet, poorly maintained (e.g. large cracks or holes), or poorly designed (e.g. high steps between walking surfaces). Our research is helping design improved standing surfaces and resting areas that promote lying in the stall.

The stall surface is one of the most important features of the resting area. Softer surfaces promote lying: mattresses are better than mats, and bedded surfaces (e.g. sand or sawdust) are better than bare mattresses. Our experiments have shown that softer surfaces, like deep-bedded sand or sawdust, can increase lying times by several hours a day. These surfaces also prevent leg injuries such as hock lesions and swollen knees.

Although deep-bedded systems provide benefits for cattle, these need to be maintained. Without regular raking, stalls begin to look like bathtubs, while cement curbs, brisket boards, and stall partitions can all become obstacles for the cow. We have found that cows lie down 1-2 hours less every day when new bedding has not been added over the past week.

Other aspects of stall design can affect standing and lying times. Recent work has shown that increasing stall width from 45" to over 48" can increase the time spend lying down by about 1 hour per day (see Research Reports Vol. 2, No. 8), and decrease time spent with only the front two hooves in the stall. Placing the neck rail too low, or too close to the entrance of the stall prevents cows from standing completely on the stall surface (see Research Reports Vol. 3, No. 1). Although this helps prevent cows from defecating in the stall, it also forces cows to stand on concrete and likely increases the risk of hoof problems. It is important to recognize that the stall provides a location for cows to both lie down and to spend time standing on a non-concrete surface.

Well-designed and managed stalls improve lying times and reduce time spent standing on concrete.

The development of better standing and walking surfaces is another important research area for our group. We have found that dairy cattle spend close to 6 hours per day standing in front of the feed bunk, so this is an obvious area for improvements (see Research Reports Vol. 3, No. 3).

Some producers have now started to look for alternative flooring and walking surfaces for cows, such as rubber mats and conveyor belts. We found that cows spent slightly more time standing at the feed bunk when provided a rubber surface compared to concrete. Frances Flower has worked with Drs. Rushen and de Passillé to identify more innovative walking surfaces, and has found that soft textured rubber can provide both good comfort and good traction. The next generation of flooring surfaces may be best installed in 'feeding stalls' that are raised above the alley floor and provide a comfortable, dry surface for cows to stand on while eating.

Another approach is to improve management of the feed bunk. Ph.D. student Trevor DeVries has found that reducing stocking density at the feed bunk allows all cows better access to feed, reducing the amount of time cows spend standing waiting to eat. Sabine Dipple, a visiting researcher from Germany, is now studying the effect of overstocking on the development of lesions and other hoof problems, especially early in lactation when many animals first develop these injuries. Time on pasture during summer months may also reduce injuries as is currently being studied by M.Sc student Lorna Baird.

Cows benefit from using softer flooring surfaces with good traction. Management practices that reduce the time cows spend standing on wet concrete should be favoured.

In conclusion, new research projects at the UBC Dairy Centre are helping to identify improved methods of detecting and preventing lameness. Stay tuned to Research Reports for updates as these results become available. We thank our many supporters of this research (listed at www.agsci.ubc.ca/animalwelfare).

Dan Weary and Nina von Keyserlingk are faculty members in UBC's Animal Welfare Program.

Plan to attend the seminar on Hoof Care and Lameness at the Pacific Agriculture Show – Dairy Expo on Friday, February 20th at 10:00am.