



THE UNIVERSITY OF
BRITISH COLUMBIA

RESEARCH REPORTS



dairy education
& research centre

Vol 2 No 5

July 2002

Measuring Cow Comfort

Cassandra Tucker and Dan Weary

Dairy cattle require a comfortable environment in order to enhance their welfare and to maximize production. Since cows spend 40-50% of their day lying down, a comfortable space for lying is particularly important. There are also important health benefits associated with adequate rest. Reduced lying time results in physiological changes, such as a decreased secretion of growth hormone and an increase in circulating levels of the stress hormone, cortisol. Finally, increased standing time on concrete floors increases lameness. In addition to the health benefits of adequate rest, cows are highly motivated to lie down. For example, after 3 hours away from both food and a place to lie down, cows will choose to lie down instead of feeding. Poor stall design can be one cause of a reduction in lying time.

At the UBC Dairy Centre, we have begun to apply modern techniques to the study of cow comfort. Three of the most promising techniques are: 1) testing cow preferences for different housing options, 2) assessing how much cows actually use various stall designs, and 3) assessing the effects of housing options on factors such as cow injuries and stall cleanliness. We have performed a series of experiments to determine the effects of stall dimensions, stall surfaces, bedding types and other features on cow behavior and health. The results of these experiments will be described in future Research Reports. In this Report, we will illustrate these methods in the science of cow comfort, and then describe examples from recent experiments on the effects of amount of bedding.

How can we determine what kinds of stall features are important to dairy cattle? Until recently, industry specifications have been based on a 'best guess' approach, as few people realized that we could put the question directly to the cow. We "ask" cows about their preferences by providing them with a number of options, for example three bedding types, and monitor which option they choose to lie down on. In essence, we let them vote with their feet for their favorite bedding type. This approach, called preference testing, has proven to be a powerful technique in studying animal behaviour in order to design better environments for animals.

Preference tests can be used to identify what cows like, but what are the practical implications of these preferences on your farm? For example, when cows are limited to a single bedding type, as is usual on a farm, will they spend less time lying down in the stalls bedded with the material they may not prefer? To answer this question we performed tests of stall usage, in which cows had access to only a single type of stall and simply had to decide how much to use it. To get a complete and accurate record of the time cows spent standing and lying down in the stall, we used video cameras and time-lapse recorders from the surveillance industry. With this equipment we have records of the cows' behaviour for every minute of the day and night, and can watch the tapes to measure stall usage.

We are now testing new technology that will allow us to perform this type of experiment more efficiently. Electronic sensors have been developed that can be taped to a

UBC Dairy Education & Research Centre

Faculty of Agricultural Sciences Nelson Dinn, Manager Email dinn@uniserve.com
6947 No. 7 Highway, P.O. Box 202, Agassiz, BC V0M 1A0 Telephone 604-796-8410 Fax 604-796-8413
www.agsci.ubc.ca/dairy_centre/

cow's leg to continuously record if she is standing or lying. With this technology, we need only download the information from the sensor when the cow comes into the parlour for milking, thus freeing up time that researchers would otherwise have to spend watching video surveillance tapes.

In addition to finding out which stall features cows prefer, and how access to these preferred stalls increases stall usage, we need to know the effects of stall design on stall maintenance, cow health and cow productivity. For example, neck-rail placement can affect stall cleanliness, and stall bedding can affect udder health (as described in Research Reports Vol 2, No 1). Another area we've focused on is how stall designs can be improved to reduce injuries, such as skin lesions on the legs.

We have used all three techniques (measures of preference, stall usage and health) to address the issue of how much bedding should be used on geotextile mattresses. We started by measuring preference. Cows were allowed to choose between stalls bedded with 0, 1, or 7.5 kg of kiln-dried shavings spread on top of individual geotextile mattresses. These three levels represent the variation in mattress management seen in the industry: bare, a little bedding to absorb leaking milk or heavily bedded. In our study, all cows chose the heavily-bedded stall.

We measured stall usage when cows had access to only one level of bedding, and found that cows spent about two hours more lying down when they had access to the heavily-bedded stalls, compared to stalls with bare mattresses (see Figure 1).

Finally, we looked at how the amount of bedding on mattresses affects cow health. In one experiment, we compared the development of hock lesions on mattresses with and without a bedding retainer. We found that cows were less likely to develop lesions when using stalls with a bedding retainer, probably because of the increase in effective bedding depth. Thus cows not only prefer and spend more time lying down on mattresses with more bedding, additional bedding also reduces the number and severity of hock lesions.

This three-step approach, (measures of preference, usage and health), provides a set of proven tools in our work to identify better housing systems for dairy cattle.

Watch for upcoming Research Reports in which we show how these techniques have been applied to other questions in stall design, such as appropriate stall width and neck rail placement.

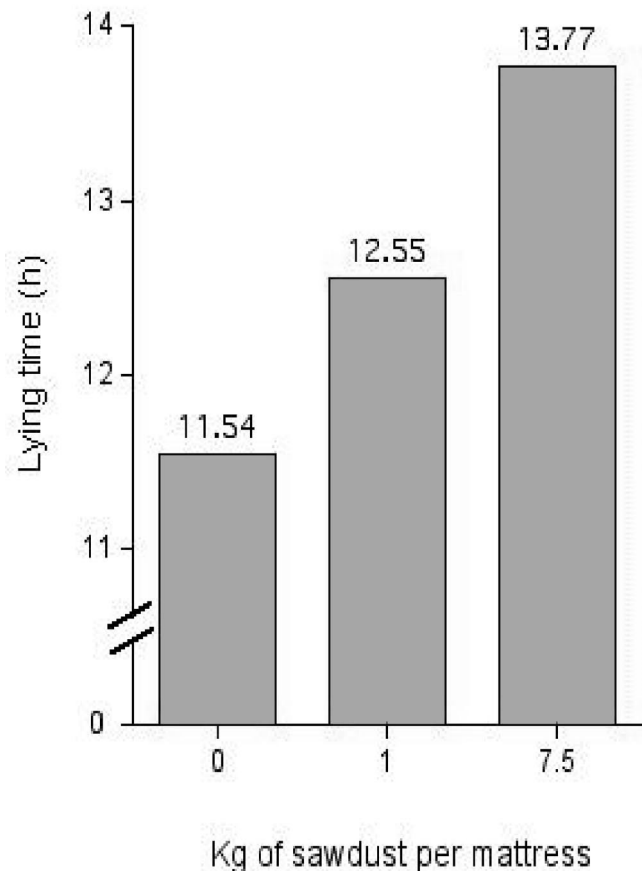


Figure 1. Cows spend more time lying down when the mattress is presented with more sawdust.

Thanks to the dairy industry for their support of this research. Supporters are listed at www.agsci.ubc.ca/animalwelfare.

This article is based on thesis research of Ph.D. student Cassandra Tucker. Dan Weary is an Associate Professor in the Animal Welfare Program and can be contacted at danweary@interchange.ubc.ca