Lack of behavioural change during estrus in tie-stall housed cows limits pedometer efficacy

The Importance of Estrus Detection

The accurate and efficient detection of estrus is essential in improving the performance of dairy herds and maximizing producer profits; over $300 million is lost in the US annually due to shortcomings in this important aspect of reproductive management.

Scanning of pedometers

Although the behavioural changes that characterize estrus can be monitored directly, the labour costs associated with this practice would decrease economic gain. Previous studies have shown that pedometers have a high degree of accuracy in estrus detection in cows housed in free-stall systems. However, 75% of Canadian farms use a tie-stall system.

The AfiMilk Pedometer Plus Tag system is a unique pedometer that is able to monitor the number of times the cows lie down and duration of lying time, in addition to the number of steps the cows take. In our study, 19 estrus-induced cows were fitted with these pedometers that were scanned twice daily, along with the 18 pregnant cows not in estrus that were used as a comparison group. The accuracy of the pedometer was also confirmed using video surveillance.

Cows Did Not Change Behaviour During Estrus

During the period when the cows were predicted to be in estrus, they did not express an increase in steps nor did they lie down more frequently or for shorter periods of time in comparison to the cows that were not in estrus. Additionally, rectal temperatures and levels of feed intake, two other variables commonly used to predict estrus, did not differ.

During the entire ten day period of this study (including estrus), however, estrus induced cows spent less time lying down overall than the pregnant cows.

Pedometers Are Limited By This Lack of Change in Activity During Estrus

Since the pedometer detects estrus by detecting changes in activity levels, the absence of differences between cows in estrus and those not in estrus suggest that pedometers are not a reliable method of detection in a tie-stall facility.

However, previous studies have shown these pedometers to be effective — these experiments gave the cows an out-of-stall exercise period that this study did not. Likely, the exercise period allowed cows to demonstrate more estrus behaviours associated with interaction with herdmates.

Silent Estrus May Have Affected Activity Levels

Silent estrus occurs when cows enter estrus without showing obvious behavioural signs. It appears to occur most frequently during the first ovulation, then occurs less often with subsequent ovulations.

Silent estrus has also been shown to be more common in high-producing dairy cows, such as the ones monitored in this study. This factor may have also contributed to the shorter average lying time in high-producing estrus-induced cows, since these cows would have to spend a greater time standing while eating to meet their increased energy demands.

Cows fitted with the pedometer

Conclusions

The AfiMilk Pedometer Plus Tag System is accurate in its ability to detect steps taken, number of lying events, and duration of lying, which are factors indicative of estrus. However, the cows in this study did not display differences in activity levels during estrus. Poor estrus expression in lactating dairy cows impedes estrus detection even with electronic aids, particularly when cows are housed continuously in tie-stall systems.

Acknowledgements
Thank you to Alberta Milk, Alberta Innovates BioSolutions, Alberta Livestock and Meat Agency, Agriculture and Food Council of Alberta, and Alberta Agriculture and Rural Development for funding this study. We gratefully acknowledge Afikim (Israel) for donating the AfiMilk Pedometer Plus Tag system.

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