

Dairy Extension

Cow sensor technology – Are you using it?

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In recent years, there has been increased interest in technologies that automatically monitor cow behavior and physiology. We have been doing research with sensors that record cud chewing time, rumen temperature, and resting time. We are also investigating the association between feeding, resting and rumination (cud chewing) times during the close-up dry period with transition cow health disorders early in lactation in collaboration with Ricardo Chebel in the University of Minnesota Veterinary School.

From an animal welfare and health perspective, and considering that cows today are more commonly housed in groups instead of individually, the use of sensors during the transition period can be a valuable tool to predict cows at risk for transition health disorders and also to evaluate the overall transition management on the dairy. Cows that are more susceptible to stresses in their environment will be sentinels (the 'canary in the mine') to alert us for the need to improve housing, handling, nutrition, feeding management, grouping, and so on.

In one of our studies with 925 Jersey cows, we found that there was a significant reduction in daily close-up dry period feeding time for cows that developed metritis, ketosis, retained placenta, lameness at 0 days in milk and lameness at 35 days in milk compared to cows without the respective disorder during early lactation. In addition, there was a tendency for a reduction in feeding time for cows with displaced abomasum and cows carrying twins. We collected the feeding behavior data using cameras (a very tedious and long process), but there are automated monitors in the market today that can collect this behavior using loggers on the legs of the cows and recorders at the feedbunk. Those same loggers can also record resting (lying) time and cow activity. We found that lying time could also be a predictor of transition cow disorders, but possibly less reliable than feeding behavior or more difficult to interpret. Activity and lying time might be more important to detect cows in heat. More research is needed, and we are hopeful to receive some federal funding to work with these loggers in the next year.

Our preliminary work with rumination sensors fitted on 296 Holstein cows from approximately 20 days before to 20 days after calving found that there was a tendency for retained placenta to be associated with rumination time and that from days -4 to 10 relative to calving, cows with retained placenta had significantly reduced rumination time. Although there was no association between sub-clinical hypocalcemia (low calcium concentration in the blood) and rumination time overall, the interaction between sub-clinical hypocalcemia and days relative to calving was associated with rumination time which resulted that on days -16, -13, -11, and 0 relative to calving, animals with sub-clinical hypocalcemia had reduced rumination time. Concentration of calcium in the blood was correlated with rumination time. Similarly, ketosis was not associated with rumination time but the interaction between ketosis and days relative to calving was associated with rumination time which resulted that from days 6 to 17 relative to calving, animals with ketosis had reduced rumination time. Concentration of beta-

hydroxybutyrate (a ketone, so it is used to diagnose ketosis) was correlated with rumination time. In summary, transition cow disorders were associated with altered rumination time during the transition period. In additional preliminary work by Chebel looking at specificity and sensitivity of correctly detecting disorders, it was concluded that cud chewing data may be used for diagnosis of stillbirth, sub-clinical hypocalcemia, retained placenta and metritis. It is therefore suggested that rumination sensors can be a valuable tool to predict cows at risk for transition disorders. We would like to continue our research with more animals to further investigate these sensors during the transition period.

Along with Brad Heins at the West Central Research and Outreach Center in Morris, we are also using rumination sensors with cows on pasture. We have 230 cows being tested now, and we will be investigating the use of these sensors for disease and heat detection. Cows housed in groups at pasture are also difficult to visually evaluate, so sensors can be our 'eyes' 24 hours a day, 7 days a week. The sensors continued to work even as we battled the coldest winter in the last ~40 years in Minnesota.

More individual cow sensor technology is being developed and tested. The world of precision dairy management is exciting. Mark your calendars for our next Precision Dairy Conference and Expo on June 24-25, 2015. We plan on holding a Precision Dairy event every other year (with the possible exception of 2017; the cycle will resume in 2018). The 2015 Precision Dairy event will have more of a national scope, with producer and industry panels, plenary talks and a trade show, but no scientific abstracts. Hope to see you in Rochester!

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