



# Research Reports

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### **Pedometers on dairy cattle can point to better fertility**

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*At a glance: Automated activity monitor research reveals a correlation between the intensity of estrous expression and pregnancies per insemination.*

Estrous detection in dairy cattle is one of the biggest issues in the dairy industry, contributing to an annual loss of \$300 million in the dairy industry when estrous detection fails. These losses are due to prolonged calving intervals and days open, reduced milk production, and increased veterinary costs, among other reasons.

Standing to be mounted has been the gold standard for heat detection, but the frequency of standing events has been declining over time. Thus, technology has brought us automated activity monitors (AAM) to better identify estrus behavior, with the goal of getting cows pregnant efficiently. Our laboratory at UBC is studying how this data can be best used to detect estrus for the best opportunity for pregnancy.

Increased physical activity is considered a secondary feature of estrous expression in dairy cattle and nowadays AAM have been used to reliably identify cows in estrus. Accelerometers and pedometers are the most common AAM used in the dairy industry. In general, most AAM follow the same concepts in order to create estrus or health alerts. For example, when using accelerometers, the monitor will use an algorithm to calculate an index of physical activity by combing the data measured by the 3D accelerometer. A rolling average in physical activity is calculated to use as the baseline for each animal, which in turn becomes a reference value to calculate the relative increase or decrease in activity at a given period of the day. In the case of alerts for estrus, the relative increase in physical activity has to reach a threshold that is set for each AAM system.

Interestingly, we have found a strong correlation between the relative increase in activity at estrus from the AAM systems and pregnancy per artificial insemination (AI). We found animals that had a greater intensity of activity at estrus had around 12 percentage points greater pregnancy per AI, or over 30% improvement in fertility, than animals that had lower estrous expression. In that study we included only animals that spontaneously came in estrus. But even when using a timed AI protocol that induced ovulation using estradiol and that consequently induce estrus, we found a similar effect of estrous expression intensity (Figure 1). Even more interesting, we also found a correlation with pregnancy losses from 31 to 60 days post-AI (Figure 2) and estrous expression. Cows that had a lower increase in physical activity were more likely to have reduced pregnancy per AI and increased pregnancy losses.

Our research was the first to report the association of intensity of estrus expression with fertility and pregnancy losses. Animals that had greater estrous expression had higher pregnancy per AI and reduced pregnancy losses. These results provide further evidence that measurements of estrous expression (i.e. on spontaneous estrus, timed AI) might be a reliable predictor of fertility and could be used as a tool to assist in the decision making of reproduction strategies at the farm level. Future research is needed to better understand and interpret the data from the AAM to optimize breeding decisions.



Figure 1. Distribution of pregnancy per AI (%) of all insemination events according to relative increase in activity at timed A.I. detected by an automated activity monitor

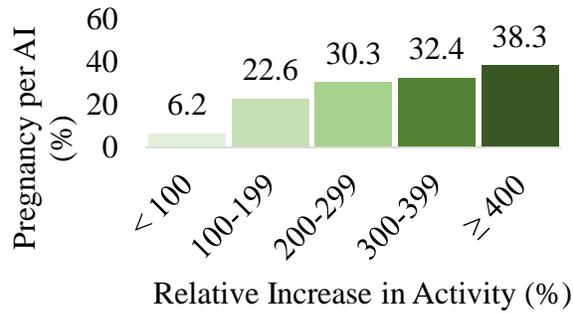
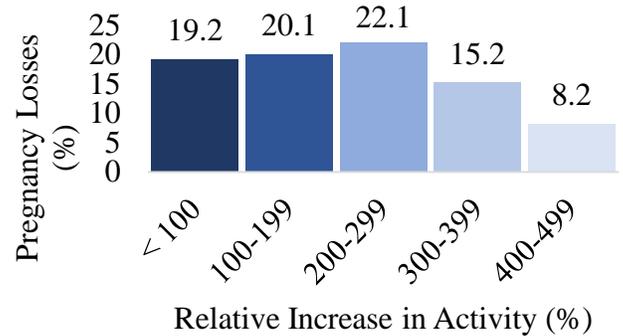


Figure 2. Distribution of pregnancy losses (%) according to relative increase in physical activity at timed A.I. detected by an automated activity monitor



*Photo, left: Augusto Madureira placing one of the automated activity monitors on a heifer at the UBC Dairy Education and Research Centre in Agassiz, BC. Augusto's research has focused on how the intensity of estrous expression detected by the monitors is associated with fertility and pregnancy losses in dairy cattle.*

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