

Effect of Intensity of Spontaneous Estrus Captured by Automated Activity Monitors on Ovulation Interval in Holstein Heifers

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Estrous expression is associated with the timing to ovulation and pregnancy per artificial insemination in lactating dairy cows. It is possible that the same associations exist in heifers, which would pose new questions of physiology, genetics, and environmental factors that could explain this relationship. The goal of our study was to investigate the relationship between estrus intensity, defined as the peak and duration of estrus activity, detected by an automated activity monitor (AAM), and timing to ovulation in dairy heifers. Animals were fitted with a neck-mounted accelerometer and the adjoining software was monitored twice daily for activity alerts. Upon alert, and every 8 h after until ovulation, the ovaries of the heifers were scanned by ultrasonography for the presence and subsequent disappearance of a dominant follicle (ovulation). Activity data recorded from the AAM provided an index, which defined estrus onset, peak, and end, and duration of estrus was reported in 2 h intervals. A total of 214 estrus events were recorded from 140 heifers. Peak and duration were correlated ($r = 0.61$, $P < 0.001$). The mean (\pm SD) interval from estrus onset to ovulation, duration, and peak activity was $27.94 \text{ h} \pm 6.4$, $14.87 \text{ h} \pm 4.45$, and 87.13 ± 14.61 , respectively. Duration of estrus ranged from 10.7 h to 51.3 h and was positively associated with ovulation interval ($P < 0.001$) with a predicted increase of 0.58 h in ovulation interval for every 2 h increase in duration. Peak activity was also associated with ovulation timing ($P < 0.001$) but was not as strong of a predictor as duration.

Take home messages: Estrous expression in Holstein heifers is positively associated with ovulation timing, and this may have practical implications for timing of AI and pregnancy, just as is shown in cows, which demonstrates that this relationship is not only a result of cow-related effects.

Predicting Disease in Preweaned Dairy Calves using Automated Milk Feeders

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Group housing of preweaned dairy calves is gaining popularity throughout the dairy industry. It benefits calf welfare by allowing for social interaction and increased ability to display natural behaviours. However, it is more difficult to individually monitor calves to identify disease occurrence. Automated milk feeders (AMFs) can be used to provide a higher plane of nutrition to group housed calves and also record individual feeding behaviours that could be used to predict disease in calves. The objective of this observational, retrospective, case-control study was to assess the changes in feeding behaviour exhibited by preweaned calves leading up to, during, and following the occurrence of disease. This study utilized data from two commercial dairy farms where producer treatment records were used to determine cases (calves treated for either respiratory or enteric illness). Healthy controls were selected at the end of the trial and matched to each case calf by number of days on the AMF. Differences in feeding behaviours, including milk consumption, drinking speed, rewarded visits, unrewarded visits, and total visits to the AMF were analyzed for 37 case calves and 37 control calves ($n = 74$ calves). On the 14 days surrounding the treatment (disease) event, case calves were found to consume significantly less milk (0d: 2.06 L/d , 95% CI: -2.97 , -1.93 L/d , $P < 0.001$) and drink slower (0d: 187.92 mL/min , 95% CI: -289.54 , -86.31 mL/min , $P < 0.001$) than their healthy counterparts beginning four days prior to disease detection. Sick calves were also found to visit the feeder fewer times for an unrewarded visit and for total visits starting three days prior to and on the day of illness detection, respectively. No differences were found between sick and healthy calves with respect to rewarded visits to the AMF. The results of this study provide evidence that feeding behaviours recorded by AMF can be used to detect disease in preweaned dairy calves.