

## Factors associated with estrus expression determined by an activity monitoring system in dairy cows administered prostaglandin F2 $\alpha$

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A total of 423 Holstein cows fitted with a collar-mounted automated activity monitoring (AAM) system (Alta Cow Watch) were included. Cows were administered 500  $\mu$ g of cloprostenol (PG); cows that did not express estrus after first PG received a second PG 14 d apart. All cows were cyclic (presence of a CL determined by ultrasonography) and the average daily milk yield and days in milk at PG treatment were  $44.0 \pm 0.34$  kg and  $69.8 \pm 0.42$  d, respectively. Estrus events were alerted by the AAM system after the activity threshold (recommended by the manufacturer) was reached. A total of 655 doses of PG were administered. The number of cows expressing estrus following first and second PG administration was 191 and 82, respectively. Overall, 64.5% of cows expressed estrus and the expression of estrus was associated with lactation number, incidence of mastitis at the time of PG treatment and number of estrus events prior to PG administration. First lactation cows had lower estrus expression than second or third and greater lactation cows ( $P=0.01$ ; 55.4, 67.7 and 71.9%, respectively). Cows with mastitis at the time of PG administration had lower expression of estrus compared to healthy cows ( $P=0.03$ ; 53.4 vs. 66.3%). The percentage of cows with at least 1 estrus event prior to PG treatment was 46.1%. Cows with 1 or  $\geq 2$  (91.0%) previous estrus events were more likely ( $P<0.01$ ) to express estrus following PG treatment compared to cows with no previous estrus event (80.5, 91.0 and 47.8%, respectively). However, estrus expression was not associated with incidence of diseases during transition ( $P=0.25$ ), average daily milk yield ( $P=0.58$ ) and season ( $P=0.30$ ) at the time of PG administration.

**Take Home Message:** Approximately one third of the cows were not alerted in estrus by the AAM system following PG administration. Cows during first lactation, cows with mastitis and those with no previous estrus event before PG treatment were less likely to be identified in estrus by the AAM system.

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## Evaluating the optimum timing of insemination in dairy cows identified in estrus by an activity monitoring system

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A total of 708 estrus events from Holstein cows fitted with a collar-mounted automated activity monitoring (AAM) system (Alta Cow Watch) were analyzed. An estrus event was identified by the AAM system after the activity threshold was reached. Estrus events were categorized as spontaneous ( $n=471$ ) or induced ( $n=237$ ) after prostaglandin F2 $\alpha$  treatment. Length (LE), onset (OE) and end of estrus (EE) events were recorded. Inseminations were done using conventional frozen-thawed semen and the time of insemination was recorded. Pregnancy diagnosis was done by transrectal ultrasonography 32-37 d post-AI. Pregnancy per AI (P/AI) and LE did not differ between spontaneous and induced estrus events, so data were combined for further analyses. LE was longer ( $P=0.04$ ) in second lactation cows compared to first or third and greater lactation cows (9.1, 8.4 and 8.3 h). P/AI was greater ( $P=0.05$ ) in first lactation cows than third and greater lactation cows (52.1 vs. 42.6%), but did not differ ( $P=0.3$ ) from second lactation cows (46.2%). The range for the interval from OE to AI and EE to AI was 5 to 36 and -10 to 35 h, respectively. The relationship between the interval from OE to AI and predicted probability of pregnancy (PPP) was not significant. However, when the interval from OE to AI increased, numerically PPP decreased in first and second lactation cows (0.54 to 0.44), but increased in third and greater lactation cows (0.40 to 0.50). There was a quadratic effect ( $P=0.06$ ) of the interval from EE to AI on PPP for first and second lactation cows; inseminations done -3 to 5 h in relation to EE resulted in the greatest PPP (0.52), however, inseminations done  $> 18$  h after EE resulted in PPP  $< 0.40$ .

**Take Home Message:** The optimum timing of AI relative to the onset of estrus was not well-defined, however, data suggest that optimal AI timing could differ according to the number of lactations. The interval from the end of estrus to AI could be a better indicator of the optimal AI timing and warrant further investigation.

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