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DAIRY INDUSTRY RESEARCH
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2015

Investigating The Physiological and Environmental Factors Affecting Estrus Expression on Dairy Farms

Project Lead: Ronaldo Cerri and Liam Polsky

Collaborating Partners: Mitacs, NSERC, BC Dairy Association, Dairy Cluster 2 (Dairy Farmers of Canada)

Total Project Funding: \$35,600

Contribution from DIREC: \$10,000

Objectives:

- To determine the association between ambient temperature and humidity, vaginal temperature, and automated activity monitoring in synchronized dairy cows.
- To examine animal and environmental factors that can affect pregnancy in dairy cows. Look into individual variations of body temperature in heat stressed conditions.
- To determine factors that can affect estrus behavior expression and intensity.

Activity Description:

- 641 lactating Holstein cows were fitted with a leg-mounted pedometer resulting in 843 evaluated activity estrus episodes.
- Vaginal temperature was monitored using thermometers attached to an intravaginal device as part of an ovulation synchronization protocol.
- Ambient temperature and relative humidity were monitored using an external thermometer loggers placed in the center of each pen.
- Milk production and body condition score were collected at the time of thermometer insertion.
- Heat stress was calculated based on the percentage of time the cow spent with a vaginal temperature $\geq 39.1^{\circ}\text{C}$, 9-11 days prior to timed AI.



Results:

- Temperature and humidity index (THI) conditions categorized as low (≤ 65) were associated with greater estrus intensity compared with medium ($> 65 - < 70$) and high THI conditions (≥ 70).
- Cows who displayed greater estrus intensity had greater pregnancy per artificial insemination (P/AI) compared with cows who expressed low estrus intensity or no estrus intensity.
- A subpopulation of cows with high vaginal temperature had decreased pregnancy under high THI conditions, but no differences were observed for high vaginal temperature cows in medium and low THI conditions.
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Key Messages:

- Automated activity monitors can act as a reliable tool for the reproductive management of dairy cows housed in warm environments.
- Enormous individual variation in thermotolerance and estrous expression was found. Potential for selection of sub-populations with ideal phenotypes is probable.
- There was no observed relationship between THI and vaginal temperature as commonly reported in the literature. Again, variation is greater than initially hypothesized.
- Future research should aim to refine variables related to hyperthermia as well as possibly selecting sub-populations with better tolerance to heat stress.

Acknowledgements:

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DIREC Mission Statement:

The BC Dairy Association actively funds research and education projects. Our objective is to facilitate, encourage and financially support projects and programs that have been identified by the BCDA to benefit the BC dairy industry.

