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Helping cows with reduced estrous expression achieve greater fertility

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Infertility of lactating dairy cows represents a major challenge for dairy production. In order for proficient outputs, modern dairies using year-round calving are required to have well-functioning reproductive programs that enable sufficient replacement rates, optimal milk yields and a consistent income all year long. Reduced reproductive performance has been associated with declines in economic returns due to reduced milk yield per cow per day, lower production of replacement heifers, and increased culling. Estrous detection is a key factor to obtain successful reproductive programs. Detection of estrus in dairy cattle is not a recent problem and is a challenge to the dairy industry.

Physical activity is considered a secondary feature of estrous expression in dairy cattle and nowadays automated activity monitors (AAM) have been used to reliably identify cows in estrus. The AAM are effective at detecting estrus events (80-90% detection rates). Our laboratory became interested in understanding the factors associated with the characteristic increase in physical activity that occurs at estrus and that can be detected and quantified using AAM. Specifically, we were interested in the association of the intensity of estrous expression with fertility outcomes in dairy cows.

Recently, studies from our lab have found a strong correlation between increased physical activity at estrus, detected by the AAM, and fertility. This relationship has been confirmed using multiple AAM systems across different locations. We found that animals that had a greater intensity of physical activity at estrus had approximately 12% points (or around 30% relative improvement) greater pregnancy per artificial insemination (AI) than cows that had lower estrous expression. We also noted an association with pregnancy losses, as cows that had a lower increase in physical activity were more likely to have higher pregnancy losses compared with cows that had a greater increase in activity. The association between intensity of estrous expression, and lower pregnancy per AI and greater pregnancy losses, led to studies by our laboratory attempting to mitigate these negative effects linked with estrus events of less intensity.


Tracy Burnett at the UBC Dairy Education and Research Centre in Agassiz, British Columbia. Her research has focused on how the intensity of estrous expression detected by monitors is associated with ovulation and fertility outcomes in dairy cattle.

Previous data from our group has indicated that estrus events with lower intensity estrous expression are more likely to be followed by ovulation failure, shorter intervals from the beginning of estrus to ovulation, and lower fertility. A recent study evaluated the administration of a single dose of gondatropin-releasing hormone (GnRH) at the moment of AI to stimulate ovulation on three commercial herds. The premise was that GnRH could benefit animals with lower estrous expression by reducing the proportion of animals with ovulation failure, thus improving fertility. Cows were divided into four groups based on the intensity of estrous expression (High vs Low) and GnRH treatment (GnRH vs Control): High estrous expression with no GnRH injection, low estrous expression with no GnRH injection, high estrous expression with a GnRH injection and low estrous expression with a GnRH injection. We found that administration of GnRH at the time of AI was able to increase the pregnancy per AI of animals with low estrous expression comparable to those with high estrous expression (Figure 1).

Figure 1. Pregnancy per AI by GnRH and estrous expression.
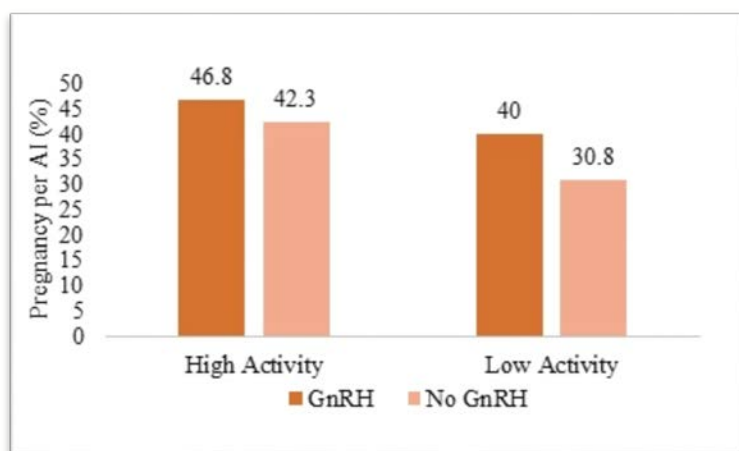
Interestingly, the impacts of GnRH at the moment of AI were found to differ by farm; however, the benefits of administering GnRH to cows with reduced estrous expression was consistent across all three of the enrolled herds. Our next steps are to determine if this relationship can also be found in heifers, and to test this strategy's effectiveness with other biotechnologies such as embryo transfer and sexed semen.

Reproductive programs with strong reliance on estrus detection are highly efficient as the intensity of estrous expression can be useful for breeding decisions and a single administration of GnRH at the moment of AI can improve fertility, particularly those cows with low intensity of estrous expression. These results provide further evidence that measurements of estrous expression could be use as tool to assist in the decision making of reproduction strategies at the farm level.

For more information on this project, please contact Dr. Ronaldo Cerri (ronaldo.cerri@ubc.ca).

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