Improve estrus detection: Monitor rumination, eating patterns

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The onset of estrus in dairy cattle is accompanied by changes in physiological activity, rumination and feeding behaviour. These alterations can be monitored via direct observation or through the use of automatic sensors to identify deviations associated with estrus, subclinical illness or lameness. Sudden drops in average daily rumination time or changes in feeding characteristics provide important clues to what is happening in the cow and possibly the herd.

It has been shown that measuring a combination of two or more physiological parameters improves estrus detection rates over behaviours measured independently. Although independent measuring of rumination and feeding patterns is crucial for accurate estrus detection, it is also important to monitor both together. Together, they tell a much more accurate picture of overall cow health and readiness for breeding.

Studies have demonstrated the association between rumination and the onset of estrus in dairy cows. It has been found that rumination time decreased by 17 percent on average (or about 74 minutes) on the first day of estrus, and that the decrease was more pronounced in primiparous cows than in mature cows. The link between estrus and feeding behaviour has been less conclusive, with several studies observing that new users of cow monitoring systems tend to breed cows as soon as signs of heat are observed, possibly before the oocyte is released.

Rumination and feeding data: Better together

In 2010 and 2011, university researchers in Germany conducted a study to gain insight into the timing of rumination and feeding behaviour in relationship to estrus in cows. Holstein cows at a federal state research farm were evaluated for rumination, feed intake, feeding time and feeding rate around estrus in four separate trials over the course of one year. Cows in estrus were identified via visual observation or physical activity and diagnosed for pregnancy 40 days after A.I. To account for unknown delays between ovulation and insemination, only data from cows confirmed to be pregnant following A.I. was included in the analysis.

Researchers found that both rumination time and feeding time decreased the day before insemination (day -1) and the day of insemination (day zero). Feed intake was lower and feeding rate was already higher on day -1 but decreased significantly on day zero. Rumination time was reduced in a timeframe of 30 hours around estrus, with the main decline found in the early hours on day -1. The findings confirm the usefulness of monitoring both rumination and feeding patterns together for improved accuracy in heat detection.

Timing of insemination

Estrus detection is just one component of successful breeding, as insemination must obviously be timed to ensure that vital sperm meet with a live oocyte. One prominent research veterinarian observed that new users of cow monitoring systems tend to breed cows as soon as signs of heat are observed, possibly before the oocyte is released.

Since cows are more likely to conceive when bred toward the end of the heat, not the beginning, producers using monitors may want to consider delaying insemination until eight to 20 hours after receiving alerts for drops in rumination and feeding time. However, each heat detection system measures and reports data differently, so producers should work with their system supplier to ensure they are interpreting data correctly for optimum timing of insemination.

Detecting health problems

Rumination and feeding data can also be used to detect a wide range of health concerns with the potential to impact fertility. Lameness, ketosis, pneumonia, ruminal acidosis, displaced abomasum and even simple indigestion are all conditions that can be detected via continuous monitoring of rumination and feeding activity. As in estrus detection, one physiological symptom alone can’t tell us much about a cow’s health, but data from multiple parameters can alert producers to subclinical problems with a high degree of accuracy. This allows for early intervention for at-risk cows, reduces treatment costs and production loss, and provides insight into the impact of management changes on the entire herd.

Choosing a monitoring system

A wide range of sensors and systems are available for monitoring rumination, feeding patterns and cow activity. Producers should choose systems that align with business goals. For example, an operation planning for growth may want a scalable solution that can be integrated into a herd management system when the time is right. The most user-friendly sensors can be attached in less than a minute on a restrained cow and should not depend on completely accurate positioning to work. Other considerations include the conditions most important for monitoring (estrus, metabolic disorders, calving, etc.), the ability to access data remotely on a computer or smartphone, location of stored data (on the farm or in the cloud) and learning curve for the crew.

Changes in rumination and feeding around estrus are likely the result of increased restlessness as an expression of readiness to mate. Automatic and synchronous monitoring of these and other physiological activities provides valuable information that allows producers to make more informed decisions about their operation. Strategic application of data gleaned from monitoring of rumination and feeding patterns can be used to increase conception rates, enhance operational efficiencies and improve overall herd health and animal welfare.

References omitted but are available upon request.

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