Dairy Pipeline

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The Importance of Controlling Contagious Mastitis Pathogens in Dairy Herds

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Mastitis, an inflammation of the mammary gland, is one of the most costly and persistent health challenges facing dairy producers. While both environmental and contagious pathogens contribute to the disease, **contagious mastitis pathogens** pose a unique and serious threat due to their mode of transmission, persistence in the herd, and economic consequences. The primary contagious pathogens of concern include *Staphylococcus aureus*, *Prototheca bovis* and *Mycoplasma bovis, and while less prevalent, Streptococcus agalactiae* is sometimes still seen on US dairies. Unlike environmental mastitis pathogens, which originate in bedding, manure, or other external sources, contagious pathogens are adapted to survive and multiply within the udder and are spread primarily from cow to cow during the milking process.

The economic impact of contagious mastitis is substantial. Infected cows often produce less milk due to damaged mammary tissue, and milk from affected quarters can have significantly elevated somatic cell counts (SCC). High SCC not only reduces milk yield but also compromises milk quality, leading to loss of quality premiums or potential penalties from milk processors. Chronic infections—especially those caused by *S. aureus, P. bovis* and *M. bovis*—are notoriously difficult or impossible to cure with antibiotic treatment, resulting in permanent production losses and increased culling rates. The financial burden extends beyond lost milk sales, encompassing veterinary costs, discarded milk, and the replacement of valuable cows.

Transmission Dynamics and Risk Factors
Contagious mastitis pathogens are typically transmitted via milking equipment, milkers' hands, cloth towels, and even teat cup liners that have not been properly sanitized between cows. Because these organisms reside in the udder, an infected cow serves as a reservoir, posing an ongoing risk to healthy herdmates. Cows with subclinical infections are particularly problematic, as they show no outward signs of illness but continuously shed organisms into the milking system.

Risk factors that contribute to the spread include inadequate milking hygiene, poor equipment maintenance, failure to segregate infected cows, and inconsistent post-milking teat disinfection. Large herds or herds with multiple milkers may face additional challenges in maintaining consistent protocols, increasing the likelihood of pathogen transmission.

Control and Prevention Strategies
Effective control of contagious mastitis requires a comprehensive, herd-level approach. Key strategies include:

1. **Post-Milking Teat Disinfection** – Applying an effective teat dip immediately after milking is one of the most proven and cost-effective measures for preventing cow-to-cow spread.
2. **Milking Order and Segregation** – Milking uninfected cows first, followed by infected or high-SCC cows, minimizes exposure risk. Chronic carriers should be culled or permanently segregated.
3. **Routine Monitoring** – Monthly bulk tank cultures, periodic individual cow cultures, and SCC tracking allow for early detection and targeted interventions.
4. **Equipment Sanitation and Maintenance** – Regular inspection and proper cleaning of milking units, particularly rubber components including liners, will help break the transmission cycle.
5. **Employee Training** – All milkers should be well-trained on milking hygiene, cow handling, and early detection of clinical signs to ensure consistent, correct practices. "Protocol drift" is a very real concern on dairies, and therefore, monthly training sessions with posted protocols help to reduce deviation.

Conclusion
Controlling contagious mastitis pathogens is essential not only for maintaining herd health but also for ensuring the profitability and long-term sustainability of dairy operations. The cost of implementing effective prevention measures is far outweighed by the economic losses incurred when these infections spread unchecked. By prioritizing consistent hygiene, rigorous monitoring, and targeted management of infected animals, producers can significantly reduce the prevalence of contagious mastitis, improve milk quality, and farm profitability. If you need help with a milk quality issue on your operation, please do not hesitate to reach out. We still maintain an active milk culturing laboratory and can assist with your samples.

Timing Matters: How Daily Cycles Impact Milk Production in Dairy Cows

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Imagine waking up every morning at the same time, having breakfast at the same time each day, and following a consistent routine – only to have it suddenly disrupted. You would likely feel off balance. Similarly, dairy cows rely on daily (circadian) rhythms to regulate key biological functions. Disruptions, such as changes in feed intake patterns, can negatively impact both milk yield and composition. This article explores the relationship between circadian rhythms and milk production in dairy cows and examines how precision farming technologies may help farmers align their operations with the cows' natural cycles to enhance productivity.

To better understand this topic, it is important to define what is meant by a circadian rhythm. A circadian rhythm refers to a biological process that repeats approximately every 24 hours. A well-known example, observed in both humans and dairy cattle, is the daily secretion pattern of the hormone melatonin. Melatonin is released during periods of darkness to help regulate sleep and reaches its lowest levels during daylight. This cycle occurs consistently each day. Moreover, this cycle can be altered by taking melatonin supplements, which induce sleepiness and affect the body's natural rhythm.

Circadian rhythms in dairy cows are closely linked to the natural environment and have evolved to support physiological function and survival. Feed intake is a prime example of a behavior that can modify a circadian pattern in metabolism (such as glucose metabolism). Under natural conditions, cows anticipate feeding and activity in the early morning, while evenings are oriented toward rest and digestion—a pattern thought to reduce vulnerability to predators. In modern production systems, however, where cows are fed a total mixed ration (TMR), the circadian rhythm can be modulated by adjusting the timing of feed delivery

and individual eating patterns of cows. This idea is similar to how melatonin supplements can shift the natural sleep-wake cycle. For cows milked twice daily, milk volume is usually greater in the morning, but milk fat and protein concentrations are generally greater at night. Researchers at Penn State University performed a series of experiments in lactating cows where nutrient availability was varied throughout 24 hours. They clearly showed that the timing of nutrient intake modified patterns of component synthesis. When the food availability period was altered between day and night shifts, it modified the daily rhythms of milk yield, fat, and protein concentration in the milk. These findings were supported by the shifted pattern of blood metabolites (such as glucose, insulin, free fatty acids, and plasma urea nitrogen), which are closely linked to milk synthesis.

In addition to the impact of daily feed intake patterns on milk production, research over the past 30 years has shown that the light:dark cycle, or photoperiod, also influences milk yield. Exposure of lactating cows to a long-day photoperiod (LDPP; approximately 16 hours of light and 8 hours of dark) can increase daily milk production by about 10% over an entire lactation as opposed to a short-day photoperiod (SDPP; Dahl, 2000). Conversely, implementing SDPP (approximately 8 hours of light and 16 hours of dark) during the dry period improved subsequent lactation milk production by about 6.6 lbs/d as opposed to LDPP (Suarez-Trujillo, 2020). This effect was related to altered prolactin hormone secretion due to changing circadian rhythms.

Understanding circadian rhythms has inspired innovation in dairy farming, encouraging producers to align management practices with cows' natural biological cycles and even affect production efficiency. For instance, automated feeding systems can be programed to deliver feed at optimal times based on cows' internal clocks, improving digestion and milk yield. These systems also provide real-time data on cow activity and production, enabling more precise management. Smart lighting technologies are another example of new technology designed to impact circadian regulation by simulating natural daylight patterns through controlled shading and artificial lighting (adjusting both duration and intensity). This helps maintain stable rhythms even in enclosed barns. For example, during winter months when sidewall curtains limit sunlight, long-day photoperiods for lactating cows can still be achieved with supplemental lighting. By standardizing environmental conditions year-round, these technologies help prevent disruptions to circadian cycles. However, research on how automation affects circadian biology in dairy cows remains limited. As science and technology continue to reshape the industry, circadian rhythms are increasingly recognized as essential to improving animal performance, well-being, and farm profitability.

Upcoming Events

September 6, 2025
Rocktown Down and Dirty
Harrisonburg, VA

September 13 – 17, 2025
All-American Dairy Show

September 22 – 26, 2025
National Farm Safety Week

September 24, 2025
Southeast Dairy Business Innovation Initiative grants closing at 5:00 p.m.

- Dairy Business Planning Grant
- Specialty Processing Equipment Grant

September 26, 2025
VA State Fair Jr. Dairyman's Contest
Doswell, VA

September 26 – Oct 5, 2025
Virginia State Fair
Doswell, VA

September 27, 2025
VA State Fair Dairy Show

September 29 – October 3, 2025
World Dairy Expo
Madison, WI

October 13, 2025 (Monday)
Hokie Cow Classic – Save the Date
Blacksburg, VA

November 7-8, 2025
Cattle WISE & Equipment WISE
Abingdon, VA

November 8, 2025
National 4-H Dairy Quiz Bowl

If you are a person with a disability and require any auxiliary aids, services, or other accommodations for any Extension event, please discuss your accommodation needs with the Extension staff at your local Extension office at least 1 week prior to the event.

Additional Notes:

▪ The dairy extension group is working with VDH to assist in distributing PPE to dairy farms. Request a kit online at https://shorturl.at/ethov or contact your local extension agent. Requests will be filled as supplies allow.

▪ Your input could guide future programming! Please complete the short survey at https://tinyurl.com/dairy-extension.

For more information on Dairy Extension or to learn more about our current programs, visit us at VTDairy—Home of the Dairy Extension Program online at www.sas.vt.edu/extension/vtdairy.html

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