Spartan Dairy Newsletter

Winter 2026 Vol. 6 No. 1

De Grins Oer Dairy

Named 2026 Dairy Farm of the Year

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Extension Educator Paola Bacigalupo Sanguesa completed her PhD at the MSU College of Veterinary Medicine (top). The new dairy farm hosted a continuing education event for veterinarians (bottom).

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Dairy farm of the year

Okkema family of Blanchard is 2026 honoree

The Michigan State University Department of Animal Science has named De Grins Oer Dairy of Blanchard, Michigan, the 2026 Dairy Farm of the Year.

Presented annually since 1958, the Dairy Farm of the Year award is the highest honor bestowed by the department, recognizing farms that demonstrate excellence in management, innovation and leadership within Michigan's dairy industry.

"The Okkema family's focus on milk quality and their implementation of innovative technologies have made De Grins Oer Dairy a model for the dairy industry," said Cathy Ernst, chair of the MSU Department of Animal Science. "We appreciate their dedication to consumer and youth education programs including hosting Breakfast on the Farm, and also their willingness to open their farm for research and extension activities. We are excited to recognize De Grins Oer Dairy as the 2026 Dairy Farm of the Year."

From seven cows to a family-run operation

De Grins Oer Dairy - translated from Frisian as "Over the Border Dairy" - was founded in 1999 by Tjerk and Ramona Okkema, whose shared backgrounds in dairy farming molded the operation from the start. Ramona grew up on a dairy farm in New Hampshire, while Tjerk was raised in the dairy industry in the Netherlands. After living and working together in the Netherlands, the couple decided to immigrate to the United States and establish their own dairy farm. The family arrived in Michigan in 1999 and began building De Grins Oer Dairy from the ground up in Blanchard.

What began with just seven cows has grown over more than two decades into a modern, highly efficient dairy operation shaped by the involvement of the entire Okkema family.

Today, Tjerk and Ramona, along with Evelyn Okkema-Damveld, Aaron Damveld, Cora Okkema and Dirk-Thomas Okkema, all contribute to the farm in ways that span daily management, animal care, fieldwork and community engagement. That spirit of familial collaboration continues to guide the farm as it grows and adapts to modern dairy practices.

The farm now milks approximately 690 cows three times daily in a 40-stall rotary parlor and operates on 1,800 acres. The herd's rolling average is 32,230 pounds of milk, with four percent fat and three percent protein, and an average somatic cell count of 49,000 that is well below the state average.

Innovation guided by shared responsibility

At De Grins Oer Dairy, progress is guided by attention to detail and a focus on animal well-being. Advanced systems, including automated post-dip teat spray robots and ear-tag monitors that track eating and activity patterns, help detect health concerns early and enhance operational efficiency.

Dairy farm of the year

These technological advances are most effective because they complement a strong management structure. As owners, Tjerk oversees the farm's overall direction and Ramona manages administrative needs. Evelyn, as herdsperson, leads herd health initiatives and Aaron supports operations as needed. Cora provides continuity and perspective from her previous experience managing the herd, while Dirk-Thomas helps connect the farm to the broader community through social media and outreach. By integrating innovation with teamwork and expertise, the family ensures that both technology and human judgment reinforce high standards and consistent quality.

Developing people and cattle

Employee training and animal care are central to the farm's approach. Working with partners through the Michigan Milk Producers Association (MMPA) and MSU Extension, De Grins Oer Dairy provides employees with guidance on processes, equipment and herd management.

Under Evelyn's leadership, updated protocols for colostrum handling and treatment have strengthened calf and heifer health outcomes and reduced mortality rates. By investing in both people and animals, the farm fosters a culture of learning, responsibility and continuous improvement - qualities that underpin its award-winning performance.

Cows are milked in a rotary parlor at De Grins Oer Dairy in Blanchard, Michigan.

Leadership beyond the farm gate

De Grins Oer Dairy regularly engages with local schools and community groups, creating opportunities for students and educators to learn about dairy production. The farm has hosted MSU Extension's Breakfast on the Farm in 2014 and 2023, opened its operation to researchers and provided learning opportunities that connect the public with modern dairy practices.

The family sees outreach not as an extra task but as an extension of the farm's values, helping build understanding of dairy farming and strengthening trust between producers and the public.

"Being a first-generation farm and growing a highly successful business is impressive on its own," said Doug Chapin, chair of the MMPA. "Their willingness to welcome the community and researchers onto their farm builds understanding and trust, creating a bridge between dairy producers and the public."

The Okkemas are also active in industry organizations and youth mentoring. Tjerk has served as a district delegate for the MMPA and Ramona has been active with the Mecosta County Farm Bureau. Evelyn serves as a dairy conformation judge, while Cora and Dirk hold leadership and volunteer roles within Farm Bureau and other agricultural organizations.

De Grins Oer Dairy

A record of excellence

For the Okkema family, recognition such as the Dairy Farm of the Year award offers a chance to reflect on the collective effort that has distinguished their operation over time. That commitment to excellence is reflected in state and national honors, including consecutive MMPA Gold Milk Quality Awards, National Dairy Quality Awards, MMPA Roy G. Chapin Milk Quality Excellence Awards and Michigan Agriculture Environmental Assurance Program verification.

The Okkema family stand in front o their farm.

These accolades celebrate not only the practices but also the famifarm's high-quality milk and innovative ly's dedication to shared responsibility, integrity and the long-term success of their operation.

"The Okkema family and De Grins Oer Dairy exemplify the standards for MSU's Dairy Farm of the Year Award through their exceptional herd management and deep dedication to serving their industry and their local community," said Miriam Weber Nielsen, chair of the award selection committee. "Their consistent focus on the details drives the herd's impressive milk quality and overall performance."

Dairy Spotlight

Beth Ventura and Alycia Bales

Beth Ventura
Associate Professor

Dr. Beth Ventura joined the MSU College of Veterinary Medicine faculty as an Associate Professor of Animal Welfare in 2025. She is a proud Spartan alumna and graduated with a BS in Animal Science in 2007. She also holds an MSc in Animal and Avian Science from the University of Maryland, College Park (2009) and obtained her PhD with the University of British Columbia's Animal Welfare Program (Canada) in 2015. She has held previous faculty roles at the University of Minnesota and University of Lincoln, United Kingdom.

Dr. Ventura's research bridges the animal and human dimensions of animal welfare and she has a special interest in dairy cattle and goat welfare. Her research focuses on how different groups understand and communicate about welfare challenges so as to identify barriers to achieving real-world solutions. She also works within applied ethology to investigate topics like pain management, enrichment, and animal cognition.

Dr. Ventura has served on the International Society for Applied Ethology ethics committee, is an Associate Editor for the Journal of Applied Animal Welfare Science, and co-founded the Animal Welfare Education Community of Practice, which serves over 190 academics from 60+ institutions across the world to build capacity in animal ethology, welfare, and ethics teaching in higher education.

Alycia Bales
Recent alumna

Growing up in agriculture, Dr. Alycia Bales always knew she wanted to work with animals. She spent almost every spare moment on her uncle's beef operation where her 4-H steers were raised. She initially attended Michigan State University with the hope of veterinary school, but instead switched paths to dairy nutrition. During her senior year, Dr. Bales joined Dr. Adam Lock's lab and her love of research bloomed from there.

Under the guidance of Dr. Lock, her MS and PhD studies concentrated on fatty acid nutrition in dairy cattle, with a focus on oleic acid, where she utilized fat supplements and oilseeds to achieve her research objectives. Within the oilseed research, she had a series of studies feeding the high oleic acid soybean which has positively impacted the Michigan dairy industry and her current position.

After graduation, Dr. Bales started a position with Caledonia Farmers Elevator as the Animal Nutrition Technical Support specialist. Her role focuses on supporting the feed team by bridging the gap between research and on-farm application, assisting with diet formulation, and sharing information on processing and feeding the high oleic acid soybean. Additionally, she has spoken at several conferences and on podcasts about her research and field experience with the high oleic soybean. She continues to collaborate with MSU and attend meetings and discussions with Animal Science faculty.

Her time at MSU helped shape Dr. Bales into the dairy nutritionist she is today and laid the foundational stones for her professional career.

News and Updates

Riley Barber

Tri-State Dairy field day highlights automation

The 2025 Tri-State Dairy Nutrition Conference field day was held in Argos, Indiana. The program featured a morning of presentations focused on the future of dairy management, followed by a tour of Homestead Dairy. This year's conference centered on the theme, "Automation on Today's Dairy Farms," highlighting how technology continues to shape modern dairy operations.

The morning began with a presentation by John Gerbitz of Robotic Dairy Consulting and Cow Corner, who discussed automated milking system management. Gerbitz emphasized the difference between human and cow priorities, noting that while people often focus on milk production first, cows prioritize lying down and eating before milking. Understanding these preferences is critical when designing facilities and managing cow traffic within robotic milking systems.

Following this presentation, Dr. Dennis Buckmaster of Purdue University discussed data integration across multiple dairy management programs and what future technology may offer. His presentation focused on how integrating data can provide valuable context for decision-making by combining information from private databases and on-farm technologies. Examples included improving total mixed ration uniformity, monitoring eating behavior through stereovision cameras, and tracking feed disappearance. Buckmaster also highlighted current applications of data integration, such as generating alerts for abnormal cow behavior, feed push-ups, breeding or culling decisions, livestock treatments, and forage sampling needs.

The conference also included a producer panel featuring Brian Houin and Amy Weaver, who shared their experiences using automated calf feeding systems. Both producers noted improvements in labor efficiency when systems were operating effectively. Houin emphasized the importance of maintaining calf groups within a 10-day age range to minimize variation in nutritional and management needs. Panelists also discussed the continued need for labor to monitor calf feeding behavior and move calves to feeders, when necessary, as well as the potential for automated systems to help detect illness through changes in drinking speed.

Tri-State field day participants view an automated feeding system at Homestead Dairy Farm.

The final presentation of the day was given by Matthew McFadden, Vice President of Food and Agribusiness Dairy at Farm Credit in Washington Court House, Ohio. McFadden provided an economic perspective on automation, noting that labor costs are currently outpacing gains in milk production per cow. He discussed the differences between semi-automation and full automation, emphasizing that even fully automated systems still require labor. The estimated cost of automation was noted at $18,100 per head, highlighting the importance of careful financial planning.

Overall, the conference emphasized that decisions surrounding automation depend heavily on individual farm circumstances, including labor availability and feed costs. Consulting with financial professionals who specialize in dairy operations can help producers evaluate the efficiency and feasibility of automation. The event provided valuable insight into emerging technologies while offering opportunities for industry professionals to connect and learn from one another.

News and Updates

Dairy cattle judging team

The collegiate, 4-H, and Ag Tech dairy judging teams attended the All-American Dairy Show, World Dairy Expo, and North American International Livestock Expo in 2025. Led by coaches Joe Domeq, Lynn Olthof, and Sarah Black, the teams evaluate dairy cows and heifers and defend their placings with oral reasons. Team members earn academic credit and get hands-on opportunities to practice classroom skills.

All-American Dairy Show, Harrisburg, PA

Team Members *(L-R):*
Olivia Black (*College*), Chloe Steiner (*College*), Abby Thelen (*Ag Tech*), Hailey Mesbergen (*4-H*), Maretta Finley (*College*), Katie Karboske (*4-H*), Laken DuRussel (*College*), Bryce Ritter (4-H), and Joey Arens (*4-H*).

Collegiate Team Results
2nd Brown Swiss
4th Guernsey
5th Holstein
5th Oral Reasons
7th Overall

4-H Team Results
5th Guernsey
6th Ayrshine

Michigan State University Dairy Cattle Judging Team

World Dairy Expo, Madison, WI

Team Members *(L-R):*
Elizabeth Hyman, Bryce Ritter (4-H), Abby Thelen (*Ag Tech*), Joe Domecq, Olivia Black (*College*), Katie Karboske (*4-H*), Maretta Finley (*College*), Hailey Mesbergen (*4-H*), Laken DuRussel (*College*), Chloe Steiner (*College*), Kara Smith, Joey Arens (*4-H*), Lynn Olthof, and Sarah Black

Collegiate Team Results
3rd Jersey
5th Oral Reasons
5th Red and White
7th Guernsey
8th Ayrshire
9th Holstein
9th Milking Shorthorn

4-H Team Results
8th Jersey
9th Red and White

NORTH AMERICAN INTERNATIONAL LIVESTOCK EXPO, LOUISVILLE, KY

Team Members *(L-R):*
Kelsey Gruner (4H), Maretta Finley (College), Gracie Triick (4H). Back row: Abby Thelen (Ag Tech), Chloe Steiner (College), Laken DuRussel (College), Olivia Black (College), Ross Kelsey (4H), and Austin Preston (4H).

Collegiate Team Results
1st Oral Reasons 1st Brown Swiss
1st Guernsey 2nd Overall
4th Ayrshire 10th Holstein

Ag Tech Individual Results
3rd Brown Swiss
7th Oral Reasons

4-H Team Results
1st Oral Reasons 1st Holstein
1st Guernsey 2nd Overall
3rd Jersey 4th Ayrshire
4th Brown Swiss

2026 Dairy Programs

I am a SPARTAN of Michigan's Dairy Industry

The MSU Extension dairy team has a commitment to enhance the **competitive advantage** of Michigan dairy producers and Michigan's dairy industry. We do this by:

- Conducting research and demonstrations directly with dairy producers
- Visiting farms to apply research-based information and concepts tailored to each unique operation
- Holding educational programs throughout the state focusing on issues relevant to the industry
- Creating and sharing educational resources through our website, social media, news releases, and emails

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MSU DAIRY TEAM ON-FARM EVALUATIONS

All dairy evaluations and trainings are...

- **Parlor Performance** combines digital vacuum recorders (VaDia) and other metrics to analyze milking protocols and parlor efficiency. Educators provide recommendations to address issues such as bimodal milking and poor milk quality. Data can also be used to tailor milker-training programs for the participating farms.

- **Feeding Management** evaluations focus on 6 core areas: efficiency, mixing, production, shrink, hygiene, and safety. A detailed report of findings and recommendations for improvement is provided. Focus areas also include pushup routine, mixing procedure, and equipment evaluation. The feeder's training and consulting program often follow up on this assessment.

- **Heat Stress** will thoroughly evaluate the farm heat stress abatement strategies. The evaluations include wind speed mapping, barn temperature, THI measurement, and other indicators of heat stress. A detailed report of findings and recommendations for improvement is provided to the farm.

- **Passive Transfer of Immunity in Calves** assesses serum total protein levels, to evaluate the effectiveness of your colostrum management and provides critical insights into your calves' immunity status. We supply a recordkeeping tool designed to help your calf care team track and analyze results, enabling data-driven decisions to optimize colostrum and calf care practices, reducing the risk of future illnesses.

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MSU DAIRY TEAM ON-FARM EMPLOYEE TRAININGS

- **Stockmanship** training will cover general stockmanship and animal handling. This training meets the requirements of the National Dairy FARM program.
- **Down Cow Management** will teach farm staff about the care of down cows and why these cases should be treated as emergencies.
- **Calf Care** will instruct dairy farm employees in basics of calf care, along with new management practices and research to grow calves to their full potential.
- **Dehorning with Pain Mitigation** is an interactive training which covers the use of a hot iron dehorner and caustic paste, as well as the proper medication administration techniques for pain management in calves.
- **Maternity** training covers critical points around calving, including the care of the cow and newborn, colostrum management, and calving difficulties.
- **Feeder** training goes over the do's and don'ts for a dairy feeder and focuses on explaining the why of feeder tasks and SOPs.
- **Hands-On Euthanasia** uses portable models and a captive bolt stunner to teach placement and protocols for proper euthanasia.
- **Farm Team Communication** reviews the concepts of active listening, effective communication, and conflict approach to improve communication on dairy teams, between colleagues, and with supervisors.

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DIGITAL PROGRAMS

- **Hay Production 101** is primarily for first time and beginning hay growers to build a foundation of knowledge on growing hay. It covers a variety of topics aimed at the unique challenges of growing hay in Michigan and the Great Lakes Region. This program is led by Forage Specialist Kim Cassida with other Extension Specialists and Educators contributing.

- **Virtual Coffee Break with the MSU Dairy Team** covers a wide variety of dairy topics, new episodes are released in the spring and fall. Each episode features a dairy extension educator and a guest expert. Episodes are available on Apple Podcasts and Spotify. Contact Martin Mangual to suggest a topic.

- **Field Crops Virtual Breakfast Series** are weekly online seminars featuring field crops educators during the growing season. This weekly series for farmers and agribusinesses focuses on a wide array of relevant field crops pest and crop management topics. The series is flexible, fluid, and able to adapt when issues arise due to unforeseen growing conditions. The series runs from March to September on Thursdays at 7AM. Register at canr.msu.edu/dairy/events.

- **Managing Farm Stress** provides resources for agricultural professionals, including teletherapy, farm management and financial resources, and stress management strategies. Visit canr.msu.edu/managing_farm_stress or contact Remington Rice.

- **FaceFarmLive!** is a short video series program about farm issues or procedure improvements relevant to dairy farmers. Videos are posted to the Facebook Groups West Michigan Dairy Farmers and Thumb Dairy Group. Contact Martin Mangual for assistance joining these groups.

- **MI Ag Ideas to Grow With** runs from February 23rd to March 5th, and features webinars on animal agriculture, field crops, farm finances, and water management. Several seminars offer RUP and/or CCA credit. Register at canr.msu.edu/miagideas. Contact Betsy Braid at braidbet@msu.edu for assistance registering.

Go to canr.msu.edu/dairy/events for a complete program listing

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IN-PERSON PROGRAMS

- **AgrAbility** provides free assistance to people in the agricultural industry who have an injury, illness, or physical disability to enable them to continue working. Staff provide personalized recommendations for assistive technologies and equipment modification, as well as bilingual on-site pain and arthritis screening. Visit michiganagrability.org or contact Sam Wolfe to schedule.

- **Artisan Cheese Workshop** is a three-day class on the art and science of cheesemaking, taught by internationally acclaimed cheesemakers from Leelanau cheese at the MSU Dairy plant in East Lansing. Participants will make six cheeses. Contact Phil Durst or go to canr.msu.edu/dairy/events to register.

- **Breakfast on the Farm** is a series of consumer events where farms open to visitors. Attendees will learn how farmers care for animals, protect the environment, and produce safe and nutritious food. Visit breakfastonthefarm.com to learn when events will occur between June and September 2026.

- **Crisis Preparedness Planning** is a partnership between MSU Extension and the United Dairy Industry of Michigan. Participants will develop an in-depth crisis preparedness plan in response to risks that can impact farm operation continuity. Contact Phil Durst.

- **Farm Employer's Workshop** provides resources for farm employers and supervisors to become better leaders. The interactive workshop covers workplace culture, communication, feedback, handling problems, and more. Contact Phil Durst.

4-H PROGRAMS

- **Michigan 4-H Dairy Conference** is a two-day opportunity for 12 to 19 year old's to learn about the Michigan dairy industry from 2/27 to 3/1.

- **State 4-H Dairy Quiz Bowl Contest** will take place on June 27th, featuring written and oral questions on dairy topics

- **Michigan 4-H Dairy Days** will occur in East Lansing from July 13th to 16th. It includes management and judging contests, as well as showmanship and a celebration picnic.

- **National 4-H Dairy Conference** in Madison, Wisconsin, is an opportunity for youth to visit the World Dairy Expo and learn about the global dairy industry from September 27th to October 1st.

Contact Kendra Van Order for additional information

Dairy Contacts

Extension Dairy Advisory Team

The MSU Extension Dairy Advisory Team is a group of progressive dairy producers and professionals selected to provide input on need in the industry and feedback on MSU Extension activities. Members serve two-year terms and meet regularly by phone and in person twice per year.

Steve Admonson
Lindsay Bliss
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Dairy Tech

Management tips

Pedro Trindade

Improving dairy calf pain mitigation

In dairy farming, hot-iron disbudding is a common calf management practice used to prevent horn growth. It is carried out to protect both workers and cattle from injury and to reduce housing space needs. However, the practice causes burn injuries around the horn bud, leading to significant pain and inflammation. This pain can compromise calf welfare, suppress the immune system, increase susceptibility to disease, and reduce growth performance.

Together, these animal welfare, health, and production concerns can reduce farm efficiency and influence how the public views dairy farming. Both the American Veterinary Medical Association and the American Association of Bovine Practitioners recommend multimodal pain management, which combines local anesthesia with non-steroidal anti-inflammatory drugs (NSAIDs), to alleviate disbudding-related pain.

However, not all calves experience pain the same way. Pain perception and responses to pain medication vary among animals, meaning that even when the same analgesic protocol is used, some calves may still experience pain after disbudding. Therefore, effective pain relief depends on the ability to accurately and continuously identify which calves are still in pain.

The Trindade lab and collaborators have developed a machine-learning system that can automatically detect pain in calves. This system uses minute-by-minute activity behavior patterns collected from commercial ear-tag sensors that are already used on many farms.

In preliminary results with 40 calves, the system showed strong performance in distinguishing between painless calves (pre-disbudding) and painful calves (post-disbudding), achieving:

- 91% overall accuracy
- 86% sensitivity (correctly identifying calves with pain)
- 82% specificity (correctly identifying calves without pain)

A calf is pictured with an ear-tag sensor used in this study. Photo credit: Pedro Trindade

Importantly, at 24, 48, and 72 hours after disbudding, the system identified about 25% of calves as still experiencing pain, even after receiving the multimodal analgesic protocol. This suggests that a meaningful number of calves may benefit from additional dose of NSAIDs to support welfare, health, and optimal growth.

Looking ahead, this technology will support the development of a user-friendly mobile app that flags calves likely experiencing pain after disbudding. The app will provide producers and veterinarians with actionable information to make targeted pain treatment decisions, rather than relying on herd-level assumptions.

This approach has the potential to:

- Improve calf welfare
- Lower disease risk
- Reduce labor demands
- Reduce wound healing time and post-disbudding complications
- Decrease unnecessary medication use
- Support optimal calf growth performance
- Enhance public confidence in early-life dairy calf care

Do you use commercial ear-tag sensors and want to test this pain monitoring system on your farm? Contact Dr. Trindade at trindad4@msu.edu.

By Pedro Trindade
Assistant Professor

Paola Bacigalupo Sanguesa

Research Drill Down

Delayed milk ejection and reduced milk yield

The letdown or milk ejection reflex is a process in which oxytocin is released from the pituitary gland of a dairy cow and travels through her bloodstream. When this hormone reaches the myoepithelial smooth muscle cells in the udder, it causes them to contract and release milk.

This process requires tactile stimulation of the teat. On dairy farms, this comes from fore stripping done by milkers or teat scrubbers. Because oxytocin travels through the bloodstream, the milk ejection reflex typically occurs between 30 seconds to two minutes after stimulation. When everything works well, the cow enters the milking parlor, her teats are stimulated and cleaned, the milking unit is attached, and she produces a consistent flow of milk for three to eight minutes. The milking unit detaches, her teats are disinfected, and she leaves the parlor.

What is delayed milk ejection?

Dealyed milk ejection (DME) is an interruption or delay in milk flow after the unit is attached. Normally, milk begins flowing within 30 seconds, and delayed milk ejection is a delay of over 30 seconds before milk flow. There are several causes and risk factors for delayed milk ejection:

Inadequate stimulation: On many farms, fewer workers are moving more cows through the milking parlor than in the past. This can mean workers are not spending the ten to fifteen seconds of hands-on time per cow to adequately stimulate the milk ejection reflex.

Insufficient lag time: Rushed employees may also provide an insufficient lag time, or the time between stimulation and milking unit attachment.

Stage in lactation: Animals earlier in lactation typically have more milk in their udders and a higher intramammary pressure than animals later in lactation. Similarly, animal milked twice a day have more time for the udder to fill and increased intramammary pressure compared to those milked three times per day.

Fear and stress: Fear and stress disrupt the production of oxytocin. Unfamiliar environments, increased handling, and new routines can all contribute to stress, especially early in the fresh period for first lactation cows.

Other factors: Past research has observed a potential relationship between lameness and milk production. Lameness is associated with increased inflammation, which in turn may negatively influence milk flow dynamics though impairment of the milk ejection reflex.

Finally, there is a positive association between herd size and DME, perhaps due to a decrease in hands-on time spent on each cow.

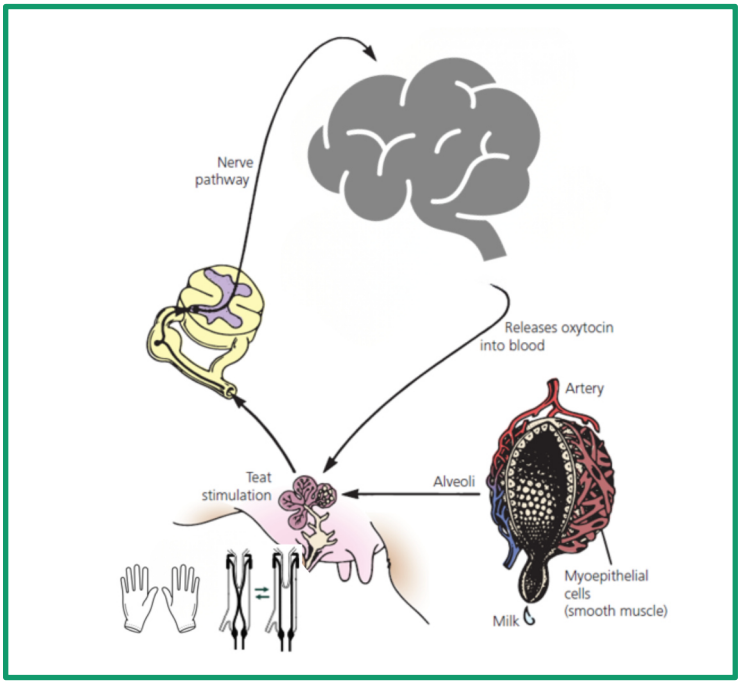

Figure 1. The milk letdown process. Adapted from: Functional Anatomy and Physiology of Domestic Animals, 6e (Wiley-Blackwell 2018).

How is delayed milk ejection detected and measured?

Understanding that delayed milk ejection is problematic is only one part of the issue. There are a few ways to measure DME on commercial dairy farms.

Research drill down

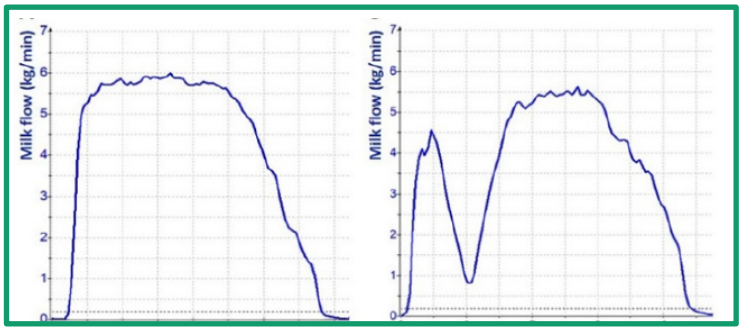

Figure 2. A graph of normal milk flow (left) and delayed milk ejection (right) as measured by a Lactocorder.

A Lactocorder is a portable milk flow meter that measures the milk leaving a cow in kilograms per minute. In the figure above, normal milk flow is shown in the left graph. Delayed milk ejection is pictured in the right graph. Milk flow initially increases as in the normal flow graph, but then decreases from 30 seconds to one minute after unit attachment.

VaDia devices monitor vacuum levels in as a proxy for milk flow. When there is low or no milk flow, the teat barrel gets thinner. This leads to poor fit between the teat and the liner of the milking unit, and allows higher vacuum pressure to reach the mouth piece chamber. Therefore, a VaDia attached to a cow with bimodal milk flow will show a higher initial pressure when milk is not flowing.

In Figure 4, the top graph shows normal milk flow where pressure on the Y-axis remains consistent over milking time on the X-axis. In the bottom graph, the higher initial pressure graphed in red indicates that milk is not flowing.

Figure 3. VaDia device (left) and Lactocorder (right). Photo credits: wmb.ch and biocontrol.no

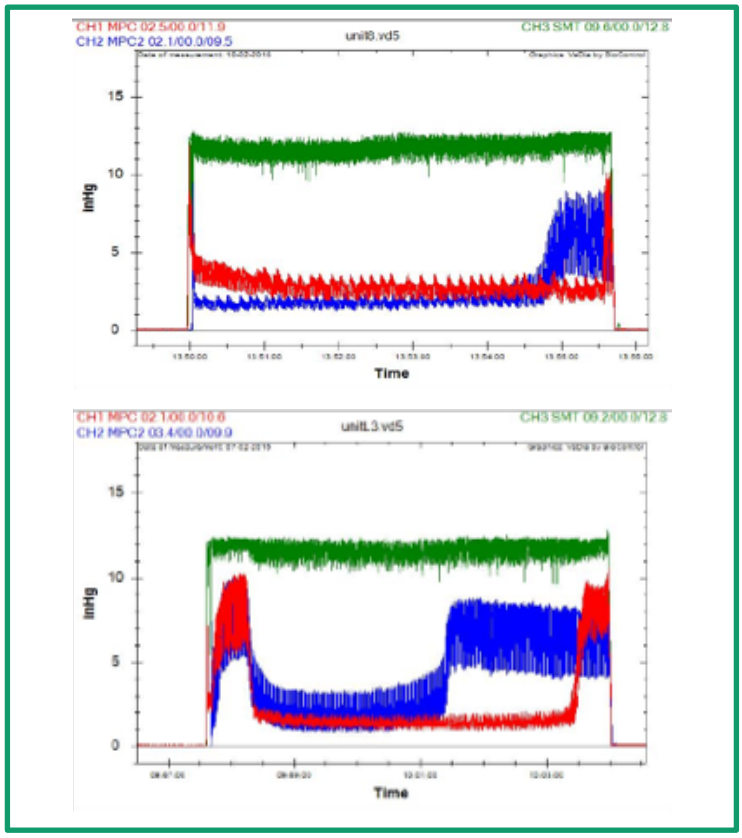

Figure 4. A graph of normal milk flow (top) and delayed milk ejection (bottom) as measured by a VaDia device.

Finally, milk flow can be visually assessed by observing milk flow into the cluster after unit attachment. However, this can be time consuming and impractical on larger dairy farms.

Why is delayed milk ejection a problem?

Delayed milk ejection isn't just a minor annoyance, it can impact the cow, the workers, parlor efficiency, and even a farm's profitability.

Teat and udder health: During low milk flow, the milking vacuum can penetrate the teat and mammary gland and collapse the teat, allowing the cups to "climb up" and interfere with blood flow. When teats lose contact with the liner, this leads to an increase in the mouthpiece chamber vacuum which induces teat congestion.

Animal welfare: Some cows shift weight, kick, or attempt to remove the cluster during delayed milk ejection episodes when low milk flow exposes the teat to high vacuum levels. These behaviors typically indicate discomfort in cows.

Research drill down

Parlor efficiency: Cows with delayed milk ejection often require increased machine-on time, decreasing parlor throughput. Recent research confirms that machine-on time is longer without adequate premilking stimulation and attributes this to a higher percentage of delayed milk ejection compared to milking with adequate stimulation.

Milking technician safety and compliance: Undesired behaviors such as kicking can cause worker injury and early cluster removals make more work for farm employees. Milkers have to clean and reattach the units. These tasks can put additional pressure on an already tight schedule.

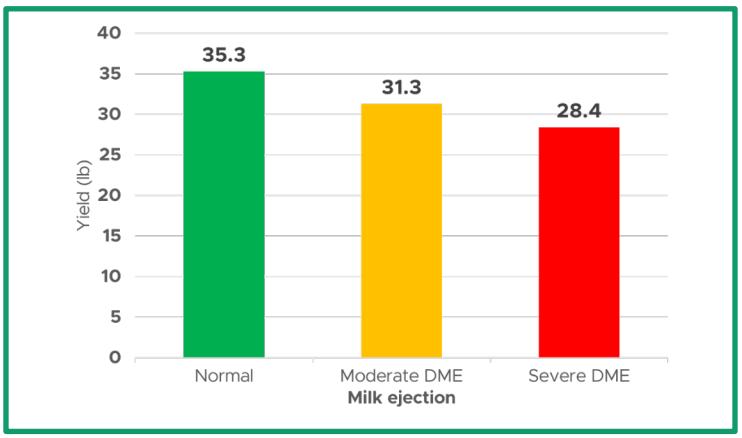

Figure 5. Milk yield in pounds as a function of delayed milk ejection severity. Image credit: Erskine et al, JDS, 2019.

Milk production: Perhaps the most significant impact of delayed milk ejection is its association with lower milk yield. Past research by MSU professor Ronald Erskine showed that cows with moderate (milk flow in 30 to 59 seconds) or severe (milk flow in over 60 seconds) delayed milk ejection produced 4 or 6.8 lbs less milk respectively than cows with no delayed milk ejection. This gives rise to the phrase,

"One minute delay, seven pounds tossed away!"

Cows experience delayed milk ejection at variable rates. Over a ten-day study period that observed 30 milkings per cow, many cows had no or a very low percentage of delayed milk ejection milkings, while other cows had rates of delayed milk ejection over 90%. As the percentage of delayed milk ejection events increased, the total milk yield decreased. This effect was consistent when accounting for parity, lactation stage, and farm.

Therefore, cows with even occasional delayed milk ejection may contribute to lower milk yields in the herd. Each 1% increase in delayed milk ejection percentage over the ten day observation period resulted in a reduction of milk yield by almost 1.2 lbs.

While it may be easiest to spot the cows that consistently have delayed milk ejection, cows that occasionally exhibit this can be contributing to lower milk yield on a farm as well.

What can I do?

Does delayed milk ejection affect your farm's bottom line? Farms should first identify if delayed milk ejection is occurring on their farms using one of the methods described earlier. If delayed milk ejection is occurring, then look for potential causes. Are your milkers adequately trained to provide enough stimulation and sufficient prep lag time? Are cows handled calmly in a consistent environment? Are lame cows identified and treated in a timely manner?

Not sure where to start? MSU Extension Dairy Educators can help! Check out the free trainings provided in the Extension program guide.

Paola Bacigalupo Sanguesa is a Dairy Extension Educator based in Ingham County. Originally from Chile, she worked in Colorado after completing veterinary school and obtained a master's degree focused on dairy cow epidemiology at Colorado State University. She is especially interested in milking efficiency and parlor management. Paola recently completed her PhD in Comparative Medicine and Integrative Biology at the MSU College of Veterinary Medicine.

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Michigan dairy recognition

Great Lakes Regional Dairy Conference Executive Committee

Ethan Haywood- Select Sires Inc.

As a genetic specialist for Select Sires Inc. Ethan Hawood works with breeders for Holstein sire development in Michigan, Ohio, and Kentucky. He also administers the NxGEN program in North and Central America, with the goal of helping farmers to minimize generation interval and maximize genetic gain.

An MSU alumnus with a degree in Animal Science, he was a member of the 2017 MSU dairy cattle judging collegiate team and the 2018 MSU National Dairy Challenge Team.

Beyond his work at Select Sires, he is a partner at Sand Creek Dairy in Hastings, Michigan. Active in the broader dairy community, he serves on the American Jersey Cattle Association and Michigan Holstein Association board of directors. Ethan and his wife Elena live in Hastings, Michigan.

Jessica Jakubik- CentralStar Cooperative

Jessica Jakubik is the Director of Organizational Development for CentralStar Cooperative, aiding the CentralStar team in their professional development and long-term organizational strategies. She has been with CentralStar for 17 years and has also served as a Genetic Consultant and Team Leader. Jessica received the Outstanding Effort award from CentralStar in 2022.

Jessica is the President of the Michigan Holstein Association and is a former adviser to their Junior Association. She's judged numerous county fair dairy shows as well as the MSU Dairy Days 4-H show in 2024, and has officiated the Michigan 4-H contests and the Intercollegiate Dairy Judging Contest at the Fort Worth Stock Show and Rodeo. Jessica and her husband Matt reside in Prescott, Michigan with their two children Jameson and Joslyn.

Megghan Honke Seidel- ANR Event Services

Megghan Honke Seidel has been an event and systems manger for the MSU College of Agriculture and Natural Resources Event Services for the past 20 years. In this role, she has coordinated numerous events on behalf of the Michigan dairy industry, including the Great Lakes Regional Dairy Conference.

She has received both the CANR Staff Dean's Award of Distinction and the Jack Breslin Distinguished Staff Award. These awards recognize her outstanding long-term service and exemplary performance.

When she is not at work, Meggan, her husband Bruce, and brother-in-law Mike operate a 1,000 head beef feedlot, 1,500 acre cash crop operation, and meat market in Ovid, Michigan.

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Mark your calendar

- **Regenerative Agriculture Webinars, Online**
  February 10th, 12th, and 17th
- **MI Ag Ideas to Grow With, Online**
  February 23rd -March 5th
- **Hay Production 101, Online**
  February 24th -March 12th
- **Tri-State Dairy Nutrition Conference, Ft. Wayne Indiana**
  April 13th - 15th
- **4-H Animal and Veterinary Science Camp**
  July 6th - 9th

View a complete events listing at canr.msu.edu/dairy/events

Want to connect with your local dairy extension educator? Find them here: