Spartan Dairy Newsletter

Summer 2025 Vol. 5 No. 2

Farm Biosecurity Remains Crucial

Protect your farm and employees

This issue's cows are from the MSU Dairy Cattle Teaching and Research Center

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Table of Contents

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Dairy at MSU

Farm biosecurity

Prioritize safety for workers and animals

On March 29th, 2024, Highly Pathogenic Avian Influenza (HPAI) was first confirmed on a Michigan dairy farm. Since then, HPAI has been confirmed in 28 other dairy herds across the state. Policies, laws, and testing requirements have changed over the past year, but a few things remain the same:

- A farm biosecurity plan cannot guarantee prevention, but it is a critical piece of risk reduction
- Disease outbreak response plans help farmers proactively approach new or worsening outbreaks
- MSU Extension has many resources to assist dairy producers

HPAI is a viral infection affecting poultry and dairy herds. Affected cattle display several clinical signs, including reduced feed intake and rumen motility, decreased milk production, thicker, concentrated, colostrum-like milk that can be discolored, abnormal or loose manure, and fever. Although few cattle die from HPAI infections, the impact of an outbreak on a dairy farm is challenging. An analysis of an HPAI outbreak on a Michigan farm led by Zelmar Rodriguez and colleagues estimated the net cost of the outbreak was $504 per affected cow, or $158 per cow in the herd.

The continued importance of a biosecurity plan:

Unfortunately, normal dairy practices and operations may have contributed to the spread of HPAI between cows and between herds in the past. While the exact methods of HPAI transmission are unknown, practices such as traveling between different work locations on larger farms, handling poultry before or after working with cattle, and failing to sanitize vehicles or equipment may transmit the disease . Therefore, minimizing these practices may be an effective way to reduce the transmission of HPAI.

Many biosecurity practices have a direct impact on animal and human health, so consistent implementation and execution is key. Ensure that farm staff and visitors understand these practices on your farm and have the tools and support to carry them out. This commonly includes:

- Separating sick animals from others and caring for healthy animals first to prevent further infection.
- Preventing contact between cattle and wild and domestic birds. This can include reducing standing water and using visual deterrents for wild birds, or adequate fencing to separate cattle and domestic poultry.
- Cleaning and disinfecting equipment and supplies appropriately, especially when traveling between different areas on a farm or handling a sick animal
- Wearing personal protective equipment (PPE) appropriate to the task, ensuring PPE is well-maintained, and replacing damaged PPE.
- Creating a plan for who to contact in different scenarios, such as when to contact a veterinarian about an animal health issue.
- Establishing a line of separation, or outer boundary, with designated access points. Additional features, such as a parking area and cleaning stations, prevent unauthorized or contaminated vehicles from entering the farm.

Preparing a plan for separating sick and healthy animals is a critical part of a biosecurity plan.
Photo credit: MSU Extension

A key component of an effective biosecurity plan is employee education and training. In many dairy farms, combining bilingual written guidance as well as visual reminders are effective ways to ensure consistency and compliance.

Farm biosecurity

Disease outbreak response plans:

Infectious diseases can spread through a herd quickly. An effective disease response plan includes the following:

- **Isolate** animal(s) showing clinical signs
- **Implement** movement restrictions on all animals at the farm
- **Contact** your veterinarian
- **Inventory** animals on your farm, identifying potential exposed animals and isolating them
- **Monitor** animal health based on veterinary advice. This can include taking temperatures and monitoring symptoms
- **Communicate** with employees, visitors, vendors, and service providers about biosecurity practices on the farm

In this example map, pink indicates an area with an active infection and blue is a buffer zone with monitoring and movement controls but no active infection.
Photo credit: University of Vermont

Other considerations for a disease outbreak include plans for safe carcass disposal, obtaining feed and other necessary supplies, and managing movement restrictions during disease spread. Maintaining an emergency contact list of local, state, and federal resources and up to date animal health records can also allow a farm to respond quickly.

Help is available from many sources:

Many resources exist to help dairy farmers create or update their farm biosecurity plans. These include the Animal and Plant Health Inspection Service (APHIS), Secure Milk Supply, Beef Quality Assurance, the Michigan Department of Agriculture and Rural Development (MDARD) and MSU Extension Educators. Programs offered by MSU Extension are available in English or Spanish, can be conducted on your farm, and are easy to schedule- simply contact the educator assigned to your county! The MSU Extension Dairy website contains news articles, contact information for dairy experts, and event listings. Dealing with uncertainty or facing herd health issues can be stressful as well. MSU Extension offers resources to manage farm stress, including a free teletherapy program, stress reduction resources, and financial management tools.

Stay up to date on testing:

As of May 2025, APHIS provides free livestock testing through two national laboratory networks. Samples are collected as part of the National Milk Testing Strategy and before interstate movement when certain conditions are met, as well as from the voluntary dairy herd status program.

In Michigan, MDARD continues to sample milk in collaboration with milk cooperatives. Samples are sent monthly from a farm or cooperative's laboratory to the Michigan State University Veterinary Diagnostic Lab (VDL) for screening. Samples that test positive for HPAI are sent to a federal lab for confirmation. Individual results are confidential and not shared with the public.

Dairy Spotlight

Robert Tempelman and Jason Knott

Robert Tempelman
Professor

Dr. Robert (Rob) J. Tempelman, PhD, has been a faculty member within the MSU Department of Animal Science since 1995. Prior to that, he was on the faculty in the Department of Experimental Statistics at Louisiana State University after graduating with his PhD in Dairy Science from the University of Wisconsin-Madison.

Dr. Tempelman is a quantitative geneticist with key research interests in statistical genetic modeling applied to various problems in dairy cattle breeding. Applications have included improving accuracy of genetic merit prediction for health and fertility traits, genomic prediction, the identification of genomic regions important for economically important traits, and joint modeling of the traits that are important components of feed efficiency in dairy cattle. His more recent work involves the use of milk spectral data to predict milk fatty acid profiles and feed intakes as well as inferring genotype by environment interaction for novel traits in dairy cattle. Dr. Tempelman has been a coauthor on nearly 150 peer-reviewed papers.

Dr. Tempelman won the prestigious J L Lush Award in Animal Breeding from the American Dairy Science Association in 2017 and recently won the CANR Excellence in Research Impact Award, along with Dr. Mike Vandehaar, for their work on the genomics of dairy cattle feed efficiency. Dr. Tempelman also teaches graduate students how to use statistical methods and experimental design for their own research programs. Furthermore, he is the Director of the CANR Statistical Consulting Center which services the statistical needs of research projects throughout the college.

Jason Knott
Professor

Dr. Jason Knott, PhD, joined the Department of Animal Science at MSU in 2007. He earned his undergraduate and graduate degrees in animal science at the University of Massachusetts, Amherst. His graduate studies focused on cattle reproduction with an emphasis on fertilization and assisted reproductive technologies, such as IVF and cloning. Following his PhD, he conducted his post-doctoral studies at the University of Pennsylvania and the Serono Research Institute.

Early in his career, he worked as an embryologist for two small biotechnology companies focused on the cloning of genetically superior dairy and beef cattle and the cloning of genetically engineered cattle that produce human polyclonal antibodies. These early roles provided him real-world experience working with cattle.

His research program at MSU is focused on genetic and epigenetic mechanisms that control early embryonic development in mice and cattle. His research focuses on the first week of pregnancy, commonly known as preimplantation embryo development. The goals of his research are to better understand the roles of candidate genes and signaling pathways in preimplantation embryos that impact pregnancy success.

His teaching program is focused on cattle and human reproduction and animal biotechnology. He teaches a very popular biotechnology course (ANS425) that covers molecular biology techniques, assisted reproductive technologies, genetic engineering, and immunology.

Dr. Knott is very interested in getting more involved with outreach and connecting with farmers and student groups to provide research expertise on early embryo development and education on the value of science in animal agriculture and biomedicine, respectively.

News and Updates

Dairy industry celebration and recognition banquet

On April 24, 2025 the inaugural Michigan Dairy Industry Celebration and Recognition Banquet took place at Brookshire Inn and Golf Club. The event hosted over 175 attendees including MSU faculty and students, dairy producers, industry leaders, and parents. Representatives from 18 dairy organizations also financially supported and attended the event. Those recognized included the 2025 Michigan Dairy Farm of the Year, Michigan Dairy Memorial Scholarship Foundation Award Recipients and Honorees, MSU Dairy Judging and Dairy Challenge Teams, and MSU Dairy Club and MSU Dairy Education Program Awards. Attendees also enjoyed a keynote address from State Representative and Michigan Dairy Producer Jerry Neyer and heard an update on the new MSU Dairy Teaching and Research Farm by Dr. Barry Bradford.

The celebration was organized and coordinated by MSU dairy teaching faculty and students. The MSU Animal Science Department is looking forward to growing this event in 2026. More information on the upcoming event will be shared on the MSU Dairy Education and MSU Dairy Extension social media. If you or your organization are interested in sponsoring the upcoming spring 2026 celebration, please contact Joe Domecq (domecqjo@msu.edu).

Key award highlights:

2025 Michigan Dairy Farmer of the Year: Tony Jandernoa, Dutch Meadows Dairy, Fowler, MI

MDMSF Honoree: Gerald Surbrook, Rives Junction, MI

MSU Dairy Education Awards: Elizabeth Hyman (Distinguished Leadership), Ava Mitchell (Academic Achievement),Bette Eggink (Outstanding Ag Tech Student), Chloe Steiner (Outstanding First Year Student)

MSU Dairy Club Awards: Kelley Chase (Outstanding 4 Year Member), Bette Eggink (Outstanding Ag Tech Member), Ava Mitchell (Outstanding First Year Member)

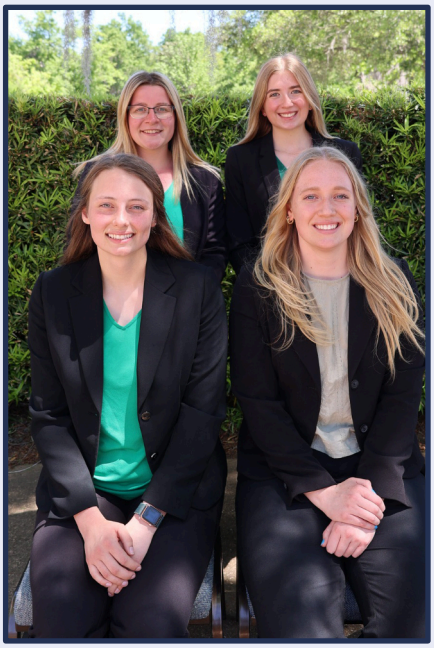
Dairy Judging Teams: 2024 Collegiate: Sadie Brearley, Rhianna Bruursema, Elizabeth Hyman, Clea Moore
2024 Ag-Tech: Lydia Deters, Bette Eggink, Lane McDonald
2024 4-H: Ross Kelsey, Ava Mitchell, Megan Wilson

MSU Dairy Challenge Teams: 2024 National: Brianna Hill, Irie Moussiaux, Danielle Rummel, Adalee Thelen
2025 National: Brianna Armbruster, Jaylin Dilsaver, Elizabeth Hyman, Clea Moore
2025 Aggregate: Riley Baker, Rhianna Bruursema, Lauren Ringewold

By Lynn Olthof
Animal Science graduate student and banquet organizer

News and Updates

Student success in the 2024-2025 academic year



The 2025 National Team composed of Brianna Armbruster, Jaylin Dilsaver, Elizabeth Hyman, and Clea Moore won second place at the Dairy Challenge in Gainsville, Florida.

Dairy Education Programs
Michigan State University

Follow Michigan State Dairy Education on Facebook to see more student photos!

The Michigan Dairy Memorial and Scholarship Foundation awarded $145,000 to 32 Ag Tech, undergraduate, and veterinary students for the 2024-2025 academic year. Established in 1957, it is the second largest scholarship program in the MSU College of Agriculture and Natural Resources.

Congratulations to Lauren Ringewold, Brianna Armbruster, Clea Moore, and Jaylin Dilsaver (pictured left to right), who earned bachelor's degrees in Animal Science with a dairy industry concentration on May 3rd.

Students in the national and aggregate Dairy Challenge Teams from MSU take a photo in Gainsville, Florida.

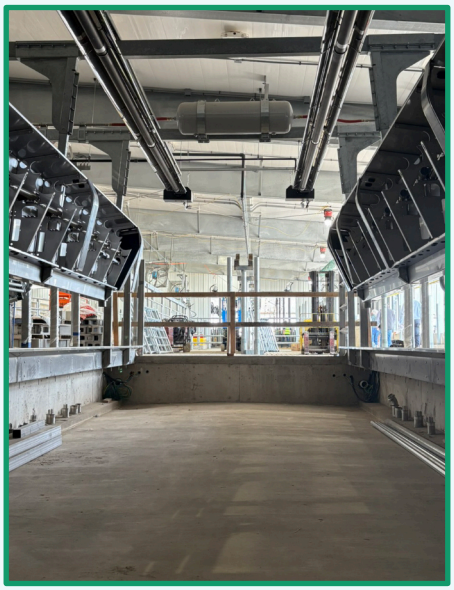
In April, a group of MSU Dairy Education students had the opportunity to gain valuable insight into the processing side of the dairy industry by touring MWC, a cheese and whey processing plant in St. Johns.

Eight students completed certificates in dairy management through the Institute of Agricultural Technology this spring.

News and Updates

Dairy facility progress

On Wednesday May 7th, MSU concluded the Circular Agricultural Economies: The Dairy Industry + Rural Development series, which consisted of three webinars and a one-day event at the MSU Henry Center for Executive Development. After a day of panel discussions and concluding thoughts from President Kevin Guskiewicz, participants traveled to the future site of the Dairy Cattle Teaching and Research Center and toured the facility. Seminar recordings and a brief video of this visit are available on the MSU Extension Dairy Team YouTube channel, @DairyMSU.



Heifer academy seminar series

This spring Dairy Educator Cora Okkema concluded the third season of the Heifer Academy, a virtual six-seminar series on issues relevant to heifer management. She spoke with experts from universities and private industryon an aspect of heifer care in each seminar. Recordings are available on YouTube @DairyMSU, and on Spotify as The Heifer Academy playlist. This spring's topics were:

Stress management and rumen and hindgut acidosis in calves
Dr. Anne Laarman, University of Alberta

Hygiene and colostrum management
Jennifer Bentley, Iowa State University

Calf transportation
Dr. Catie Cramer, Colorado State University

Calf immunity and vaccinations
Dr. Angel Abuelo, Michigan State University

Youngstock care: Making better decisions sooner
Dr. Jennifer Walker, Kinder Ground

The Calf Care Quality Assurance program
Emma Mulvaney and Cindy Valdez Nolasco, BQA

Management Tips

Corey Clark

Earned Sick Time Act (ESTA) compliance

The Earned Sick Time Act, which requires all employers to offer sick leave to their employees, was recently finalized by the Michigan legislature. For large businesses with more than 10 employees, the law went into effect on February 21st, 2025. Small businesses with 10 or fewer employees are subject to the law starting October 1st, 2025.

Under the Earned Sick Time Act, employees will accrue one hour of sick time for every 30 hours worked. The law applies to all employees whose physical work location is in Michigan, whether they are salaried or paid hourly and full-time or part-time. Employees who schedule their own hours without being penalized for a minimum number of hours are exempt.

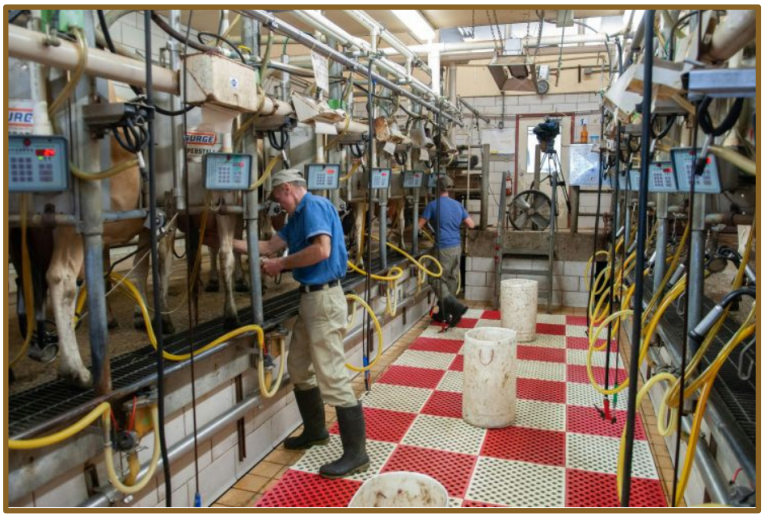
Large businesses must allow employees to take up to 72 hours of paid sick leave per year. Small businesses must allow employees to take up to 40 hours of paid sick leave each year. An employer is considered a large employer if it employs more than 10 employees in 20 or more workweeks in the current or previous calendar year. Workweeks do not have to be consecutive.

The law provides two options for accrual of sick time:

1. Employers can allow employees to accrue sick time on their actual hours worked. Salaried workers are assumed to work 40 hours per week unless their normal hours are less than 40 hours. Employers must allow sick time to be taken as soon as it is accrued, up to 72 hours of sick time per year (or 40 hours for small businesses). Unused hours must be carried over into the following year, up to 72 hours for a large business and 40 hours for a small business. Employers can restrict employees from using sick time until they have completed 120 days of employment, although they begin accruing hours immediately.

2. Employers can "frontload" sick time, providing employees with the full 72 hours of sick time (or 40 hours for small businesses) at the beginning of the year. Part-time employees would have a pro-rated number of hours. Under this method, employees can then begin to take sick time as soon as the year begins, up to the required 72 hours (or 40 hours for small businesses). There is no carryover requirement for frontloaded hours, but sick time must be made available immediately upon hire.

Sick time must be paid at the employee's regular hourly wage (or minimum wage if it is higher), not including piece-rate pay, bonuses, or overtime. For seasonal employees separating for less than 2 months, accrued sick time must be maintained through the separation. Accrued sick time does not need to be paid out upon the end of employment.



Different provisions apply to employees depending on the size of your farm or business.

The Earned Sick Time Act provides a wide range of approved uses of sick leave. Time may be taken for:

- physical or mental illness
- treatment and preventative medical care
- a family member's physical or mental illness, treatment and preventative care.

Current paid time off programs can be utilized to meet these requirements as long as they offer at least the required number of hours and allow the use of all ESTA-required sick leave uses.

Farm and business owners should contact their legal council with questions specific to their situation.

By Corey Clark
MSU Farm Business Management Educator

Management tips

Cora Okkema

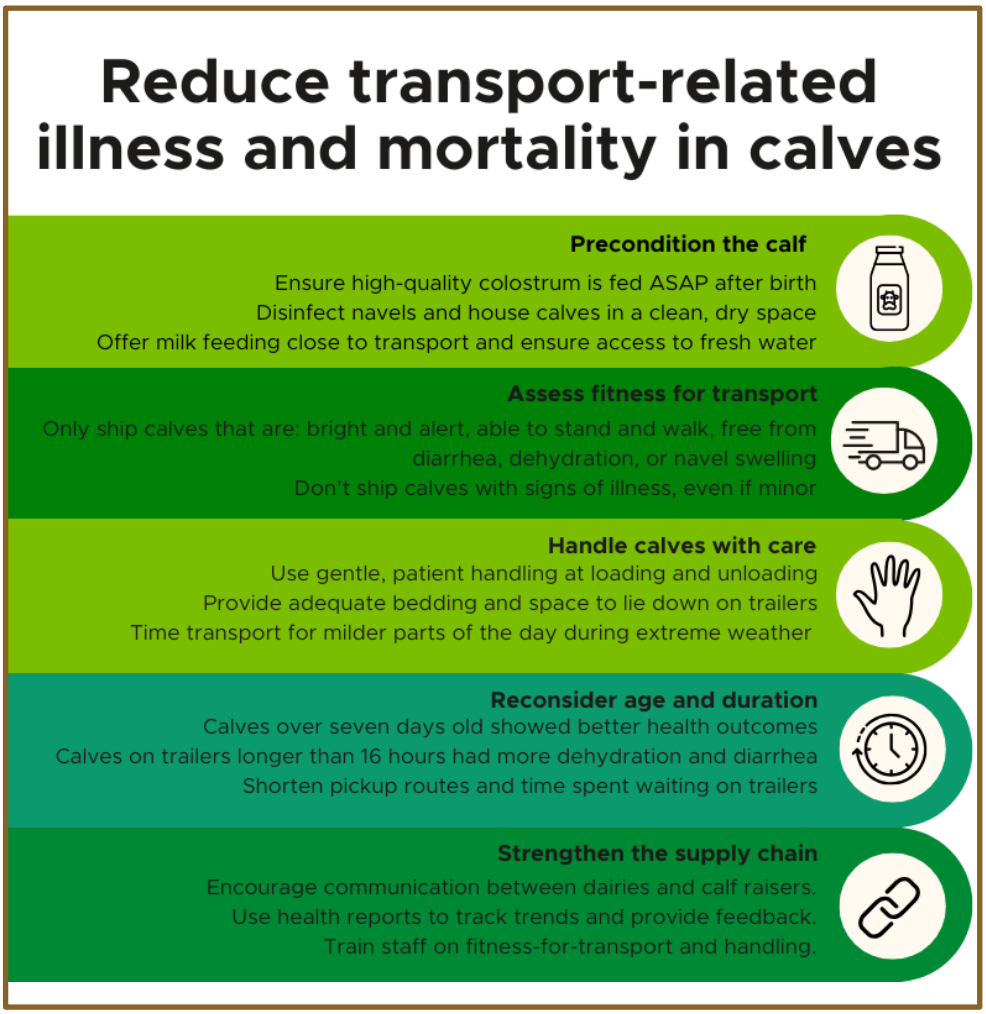
Calf transportation: Managing risk from the road to the ranch

Transportation: A hidden stressor with long-term effects

Each year in the United States, millions of calves are moved between farms, calf raisers, auctions and ranches. Many are transported within the first 24 hours of life, a time when they're especially vulnerable. Whether calves are replacements or non-replacements like dairy bulls or beef-on-dairy crosses, early transport introduces nutritional, thermal, physical and emotional stress.

Why does this matter?

Stress doesn't just cause discomfort, it increases the risk of illness, decreases growth and lowers future productivity. For replacement heifers, this can mean lower first-lactation milk yield. For beef calves, it can result in reduced carcass quality. Calves are born without an active immune system and rely fully on maternal antibodies delivered through colostrum. Those antibodies peak at about 3–4 days but begin to decline shortly after. Meanwhile, the calf's own immune system doesn't kick in until 2–3 weeks of age. That creates a window of susceptibility, where calves are more prone to disease, especially if stressed during that time. Transport during this gap can amplify disease risk significantly. Calves that are dehydrated, cold or exposed to unfamiliar environments like auctions or holding areas are more likely to develop conditions like diarrhea/scours, respiratory illness or navel infections.



What should we do?

In surveys, both dairies and calf raisers said they were willing to implement better practices, but there's often a mismatch in pricing and expectations. While most agree that preconditioning calves benefits everyone, dairies asked for at least $10/head to implement, while calf raisers were typically willing to pay $5/head. This highlights a growing need for shared standards, training and accountability to bridge the gap between farms, transporters and buyers.

Calf transport isn't only about getting animals from Point A to Point B, it's a management practice that can either build resilience or set calves back. By implementing proven strategies before, during and after transport, caregivers can dramatically improve health outcomes, profitability and overall calf wellness.

By Cora Okkema
MSU Dairy Extension Educator

Management tips

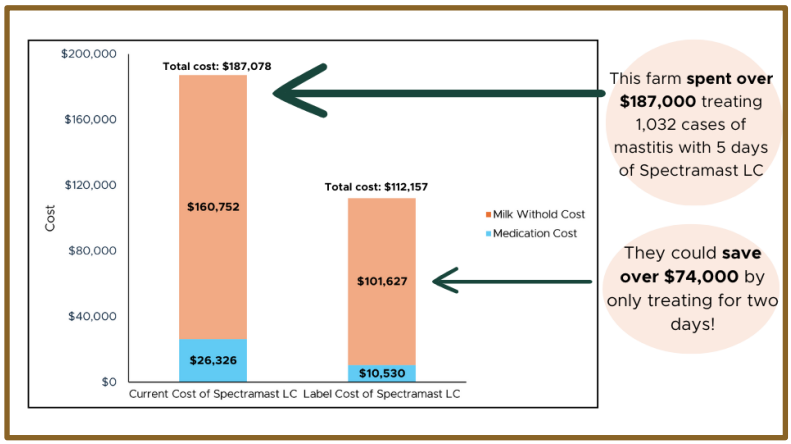
New tools for economic analysis

Jaimie Strickland (top) and Pamela Ruegg (bottom)

Treating mastitis in dairy cattle costs money- but exactly how much does treating each case cost your farm? For many dairy farms with high producing cows, the cost of milk withhold far exceeds the cost of the antimicrobials. Milk withhold cost when treating mastitis increases each day milk cannot be sold, so longer treatment durations are associated with higher costs than the label minimum duration. The label minimum is determined by efficacy studies, and is likely to be effective on your farm outside of unusual or extenuating circumstances. Contact your veterinarian if you believe this is the case on your farm. Past research from the Ruegg lab confirmed that there was no difference in treatment outcome when comparing three day vs five day treatments of Spectramast LC. Choosing to treat based on milk appearance often results in a longer treatment duration than necessary. Milk can still appear irregular even when the mastitis bacteria are no longer growing and dividing.

Can I save money?

Dr. Ruegg's lab hosts the Antibiotic Usage Benchmark Tool, a secure online program that allows farms to enter their electronic treatment records and learn how their antibiotic usage compares to that of other farms. An exciting new feature compares the farm's current cost of antibiotics and milk withhold compared to the cost of the minimum label duration antibiotics and milk withhold. In the graph at right, a farm spent over $187,000 treating 1,032 cases of mastitis with 5 days of Spectramast LC. If this farm treated for only two days, the minimum label duration, they could save over $74,000. The farm could also realize additional savings from decreased labor and supply costs as well.



Reducing the treatment duration for mastitis may save money in antibiotic costs, and more significantly in reduced milk withhold.

How does my farm compare?

The Benchmark Tool uses data from 37 large midwestern dairy farms to compare costs to a farm's records. This includes the average cost of treating a case of mastitis with antimicrobials, the average milk withhold days, and the average daily milk production. If your milk withhold days are much higher than average, especially on a farm with high producing cows, you may consider reducing the duration of your mastitis treatment protocols.

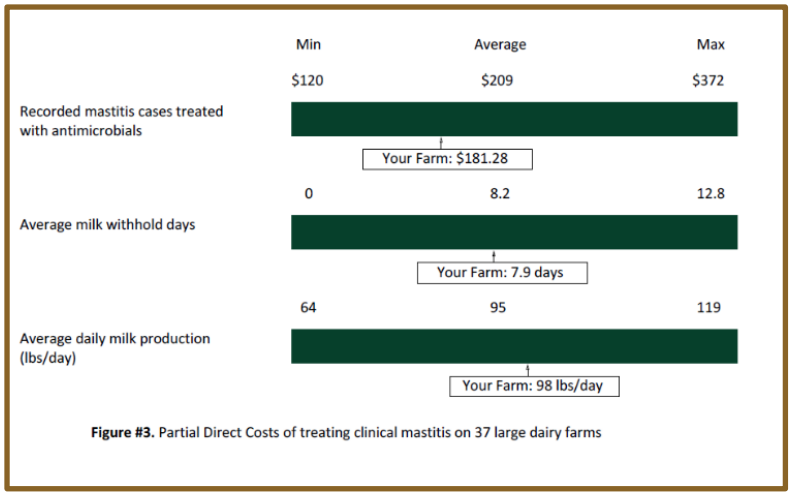


Figure #3. Partial Direct Costs of treating clinical mastitis on 37 large dairy farms

Reducing the treatment duration for mastitis may save money in antibiotic costs, and more significantly in reduced milk withhold.

Want to learn more?

You can input your treatment records at dairyantibioticbenchmark.msu.edu. The whole process takes about an hour. Want additional support? Email cvm.benchmarkhelp@msu.edu to set up an appointment with a team member for personalized assistance.

ByJaimie Strickland and Pamela Ruegg
Postdoctoral Research Associate and Professor, College of Veterinary Medicine

Research drill down

Focusing on latent carriers for controlling *Salmonella* Dublin in dairy herds

***Salmonella* Dublin, a host-adapted *Salmonella* serotype in cattle, has become substantially more prevalent in dairy and calf-rearing facilities in the United States since 2012.** *S.* Dublin bacteria isolated from American farms commonly exhibit multidrug-resistant (MDR) characteristics. This multidrug resistance substantially complicates the treatment and control of salmonellosis due to *S.* Dublin infection because no antimicrobial effective against *S.* Dublin can be legally administered to cattle in the US.

S. Dublin is a zoonotic infection, meaning that infection in cattle also presents a potential risk to human health. In this article, we summarize our recent study exploring the use of a commercially available *S.* Dublin vaccine (EnterVene®-d; Boehringer Ingelheim Animal Health) to reduce disease transmission in dairy farms.

Importance of *Salmonella* Dublin

In 2014, the United States Department of Agriculture's National Animal Health Monitoring System conducted a cross-sectional study of 234 farms nationwide. *S.* Dublin was present in 0.7%, 6.7%, and 1.8% of the operations, milk samples, and milk filters, respectively. Additionally, *S.* Dublin has been the most common Salmonella serovar isolated from bovine samples at the Michigan State University Veterinary Diagnostic Laboratory between 2018 and 2022, representing 10-20% of all bovine *Salmonella* isolations (Figure 1A).

S. Dublin has become one of cattle's most important MDR bacteria in North America. MDR S. Dublin reduces the success of treatments, delays recovery, and increases mortality and cost of treatment in humans and cattle. *S.* Dublin has a 43% higher MDR prevalence than other Salmonella isolates. The National Antimicrobial Resistance Monitoring System reported that among *S.* Dublin isolates, 84% were resistant to five or more classes of antimicrobial drugs, and 57% were resistant to seven or more. Furthermore, a 29 to 79% increase was observed in the proportion of isolates resistant to one or more antimicrobial classes when comparing 1996-2004 with 2005-2013. US isolates of *S.* Dublin are generally susceptible to gentamicin, amikacin, cefoxitin, cephalothin, enrofloxacin, meropenem, and azithromycin (Figure 1B).

Even though this pathogen is susceptible to enrofloxacin (sold as Baytril), this drug is only allowed to treat bovine respiratory disease pathogens (specifically *Mannheimia haemolytica, Pasteurella multocida, Histophilus somni* and *Mycoplasma bovis*) in non-lactating cows and dairy replacements younger than 20 months. Hence, enrofloxacin is not labeled as a treatment for S. Dublin infections, and the extra-label use of this drug is prohibited for American food animals.

Although most producers and veterinarians often treat respiratory diseases without a pathogen isolation diagnosis, current US regulations imply that enrofloxacin cannot be used when *S.* Dublin is suspected or confirmed. Thus, disease prevention

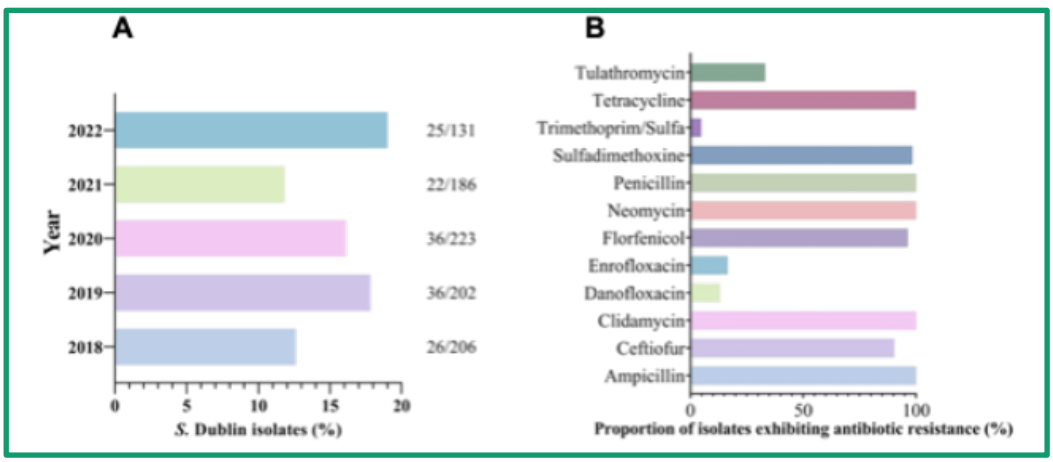


Figure 1. *Summary of 2018-2022 S. Dublin isolations at the Michigan State University Veterinary Diagnostic Laboratory.*

(A) *Proportion of Salmonella isolates that are serovar Dublin among all Salmonella isolations from cattle samples.*

(B) *Susceptibility pattern of cattle S. Dublin isolates, results expressed as percentage of isolates showing resistance to a given antimicrobial.*

Research drill down

practices have special relevance for this condition given the limitations of treating infected animals.

As a zoonotic bacterium. *S.* Dublin can cause rare but severe illness in humans, commonly characterized by acute gastroenteritis and bacteremia (bacterial presence in the bloodstream). The case fatality for *S.* Dublin has been reported as the highest compared to other *Salmonella enterica* serotypes. The US Foodborne Disease Active Surveillance Network determined an increase in the incidence of human *S.* Dublin by 7.6 times from 1968 to 2013. The same study also determined a rise in hospitalization and mortality.

Because S. Dublin is resistant to common antibiotics used in humans and animals, it can severely affect human health and compromise medical treatment. Consequently, it is fundamental to prevent and reduce the risk of infection from cattle to farm workers, animal caretakers, and from animal-derived food to humans.

Salmonella Dublin transmission

S. Dublin infection in cattle can cause respiratory disease and septicemia (blood poisoning). The disease is transmitted by two major routes: oral and vertical (Figure 2). In the oral route, susceptible cattle ingest the bacteria through contact with materials contaminated by feces or other bodily fluids (e.g., milk, saliva, nasal secretions) from infected animals. In the vertical route, infected pregnant cows transmit the disease to their offspring in utero. This can result in abortion in the last trimester of gestation or the birth of congenitally infected calves. Aerosolized transmission is also possible, especially among calves housed in tight, confined spaces.

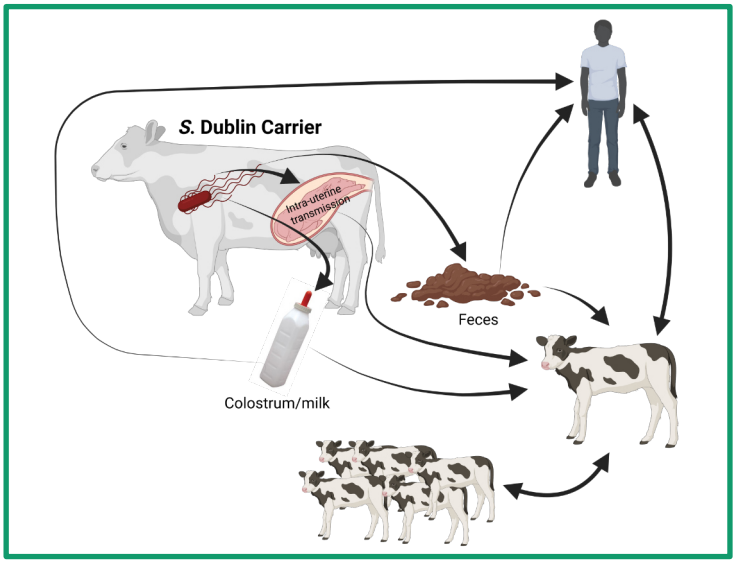


Figure 2. *Illustration of the transmission routes for S. Dublin.*

Latent carriers of *Salmonella* Dublin

Calves that survive the infection are highly likely to become asymptomatic carriers for life, shedding low numbers of bacteria in their secretions for years. This potential for asymptomatic infection and latent carriers of disease creates important challenges in managing *S.* Dublin transmission. Latent carrier cows infect calves in utero and shed bacteria during calving. Thus, controlling the spread of *S.* Dublin from latent carriers to newborns is needed to reduce disease transmission in affected herds. We recently completed a field study on four commercial dairy farms to determine the impact of vaccinating *S.* Dublin latent carrier cows during late pregnancy on *S.* Dublin in utero transmission and bacterial shedding at calving.

This randomized clinical trial took place from June 2022 to June 2023 and consisted of two phases (Figure 3). The screening phase involved the identification of *S.* Dublin latent carriers, whereas the trial phase included the treatment allocation and sample collection.

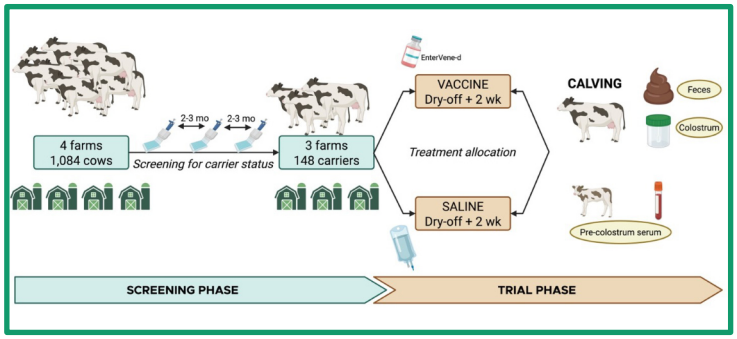


Figure 3. *Schematic representation of the study design, including screening (left) and testing (right) phases.*

Screening phase

A random sample of 250 to 280 cows stratified by lactation group (1st, 2nd, or 3rd and greater) and proximity in expected calving date were screened for *S.* Dublin carrier status at each of the four enrolled farms, for a total of 1,096 cows. Latent carriers are confirmed by detecting sustained elevated antibodies against *S.* Dublin for long periods of time. Thus, three milk samples from each cow were collected at two-month intervals as part of the regular DHI testing. Cows testing

positive in all tests were classified as latent carriers. Overall, 14.6% of the cows tested were considered latent carriers. However, this number was very variable among farms, and one farm was excluded due to the low number of latent carriers.

Trial phase

Carriers in each herd were randomly allocated to the vaccine or control group. Vaccine cows received 2 mL of a commercial live culture *S.* Dublin vaccine (EnterVene®-d; Boehringer Ingelheim Animal Health) subcutaneously (SC) within seven days of dry-off and a booster 14 days after the primary vaccination per label. Control cows received 2 mL of saline SC at the same times. All animals enrolled in the study were managed according to each farm's protocols before, during, and after parturition. Enrolled cows were maintained in the pens with their herd mates. At calving, feces and colostrum from the enrolled cows were collected, and a 10 mL blood sample from the calf was also collected before colostrum intake. Feces and colostrum were subjected to bacterial culture at the MSU Veterinary Diagnostic Laboratory, and pre-colostral blood samples were analyzed for antibodies against *S.* Dublin. Intrauterine transmission was defined when calves had a positive result on *S.* Dublin antibody at birth.

Results

Latent carriers vaccinated at dry-off with a commercial live culture *S.* Dublin vaccine were five times less likely to give birth to a seropositive calf. The concentration of *S.* Dublin antibodies was also lower in calves born to vaccinated carriers than in calves born to control carriers (Figure 4). Notably, 17.2% of calves born to cows in the control group were already infected at birth. Previous reports indicated up to 50% vertical transmission in *Salmonella*-infected cattle. Although our number is lower, it likely underestimates the actual vertical transmission, as it would be possible for in utero infection to occur close to calving, thereby not allowing the fetus sufficient time to mount an immune response that results in measurable antibodies at birth. Nevertheless, our findings highlight the relevance of the vertical transmission route for this disease, as many calves that would not show clinical signs until later in life might have been infected before they were even born.

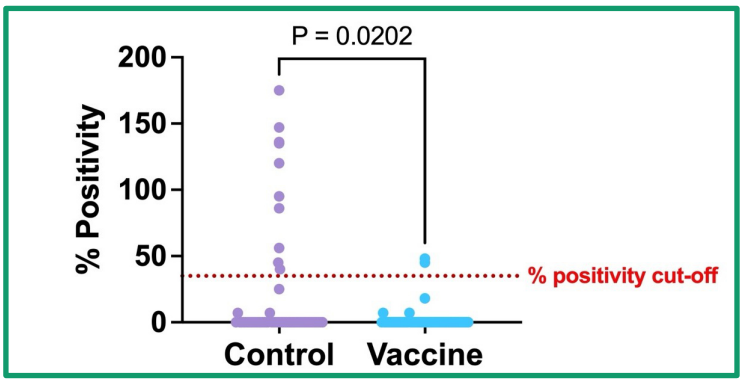


Figure 4. *Comparison of serum S. Dublin antibodies at birth between calves born to vaccine (n=60, blue) and control (n=58, purple) cows. Values are relative to a reference sample.*

Contrary to our expectations, we did not identify *S.* Dublin in feces or colostrum from latent carriers via traditional bacterial culture or molecular PCR diagnostic methods. These results make us question the identification of latent carriers based on repeated milk antibody testing, the sensitivity of the methods available to detect *S.* Dublin via bacterial culture, and/or the relevance of bacterial shedding from latent carriers at the time of calving on disease transmission. We only collected fecal samples at the time of calving, and it is possible that bacterial shedding could have started later. However, this would have a limited impact on disease transmission to the newborn in farms where dams and calves are separated shortly after birth.

Conclusions

Vaccinating *S.* Dublin latent carrier cows at dry-off with a commercial live culture vaccine reduced intrauterine transmission to calves by 81%. Further research is needed into the role of vertical transmission on disease dynamics and the role of latent carriers in infecting newborn calves through the fecal-oral route in the maternity area at birth.

Special thanks to the farms that participated in this study and CentralStar Cooperative for facilitating access to DHIA milk samples used for *S.* Dublin latent carrier screening. Learn more about our lab and research at abuelolab.com.

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Michigan dairy recognition

Shining a light on industry leaders

Dr. Donald Beitz is CANR Outstanding Alumni

300 peer reviewed manuscripts. 352 courses reaching 15,874 students. 107 graduate students. Since receiving his Ph.D from Michigan State University in 1967, Donald Beitz has accomplished all this and more as a professor of Animal Science at Iowa State University.

Beitz's contributions have advanced our understanding of mammalian lipid metabolism and biochemistry. His research addressed areas such as ketosis in dairy cows, the prevention of milk fever and the nutritional and genetic control of animal composition.

He has been an active member and leader in organizations such as the American Dairy Science Association, the American Society of Animal Science, and the American Society for Nutrition.

Photo credit: CANR communications. Article: Alex Dardas

Gerald Surbrook honored by MDMSF

Gerald Surbrook spent his life at Grand Valley Farms, his family's farm in Rives Junction until his death in 2023. Under his leadership, Grand Valley Farms milked 120 cows and cultivated 800 acres.

Beyond his work on the farm, Surbrook was a board member of the Michigan Milk Producers Association, Trustee of the Michigan Livestock Exchange, and Supervisor of the Jackson County 4-H Fair.

For his significant civic and agricultural contributions, the Department of Animal Science and the dairy community are pleased to name him an Honoree of the Michigan Dairy and Memorial Scholarship Foundation.

Photo Credit: Michigan State University

MSU Alumna Allison Heinitz active in dairy industry

Not only does she have a herd of registered Jerseys and a young daughter, but she still has time to remain involved in Michigan's dairy industry! As an active member of Farm Bureau, Allison Heinitz completed ProFILE this spring. During this 15-month leadership development program, she participated in conferences, advocacy, and trainings on public speaking, communication, and business planning.

During her time at MSU, Heinitz participated in the MSU collegiate dairy judging teams in 2018 and 2019, and she now coaches the Clinton County judging team. During the summer, she judges county dairy shows.

Photo credit: Allison Heinitz

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  Thursdays at 7AM through September
- **Grain bin and manure pit safety training, four locations in Michigan**
  June 23rd to 26th
- **All Things Bovine Leukemia Virus, Online**
  July 16th through 18th
- **Cover crops essentials, Online**
  July 28th through November 21st
- **H. Allen and Ann Tucker lecture, East Lansing**
  October 3rd
- **Dairy Education Academy, East Lansing**
  October 3rd to 4th
- **MI Dairy Industry Banquet, East Lansing**
  April 21st , 2026

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