

Spartan Dairy

Newsletter

Summer 2021 Vol.1 No.2

MSU Dairy Challenge team earns third national title in a row

L to R: Beka Kriger, Kristen Burkhardt, Miriah Dershem, and Lynn Olthof



A year of changes at the MSU Dairy

pg. 7

New Dairy Industry Concentration in MSU 4-year program

pg. 9

Calving area changes led to better results

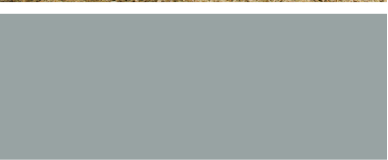
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Challenges in the milking parlor

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MSU Dairy Challenge

Third national title in a row

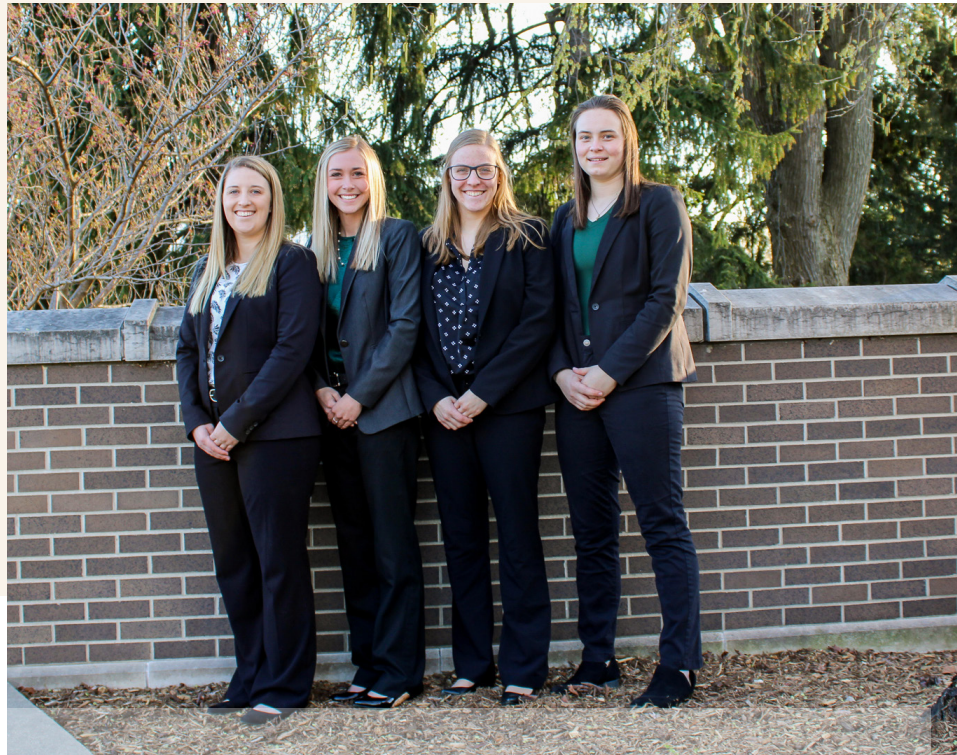
Coach Roger Thomson, DVM, describes below how the MSU Dairy Challenge team prepared to successfully compete in a national contest. In particular, he noted, Michigan State University's run of three straight first place ratings is an exciting accomplishment and a first for MSU. Remembering that this unique, holistic dairy farm evaluation contest was created in the Department of Animal Science at Michigan State over 20 years ago makes these recent successes even more satisfying.

Dairy Challenge is an extracurricular event. It does not happen in a vacuum and is not the result of a single individual's efforts. There are numerous local and regional opportunities for MSU students to participate in Dairy Challenge. Advanced dairy courses in both the Ag Tech and animal science B.S. program include evaluating dairy operations. The four students who accept the invitation to be on the national team spend hours and hours all spring semester practicing the skills necessary to analyze a dairy farm and condense their findings into a 20-minute, oral team presentation to five dairy industry professionals.

Preparing students to compete at a high level in this competition requires a solid knowledge foundation that they receive in the Department of Animal Science (ANS). This year's team members are all graduates of the Ag Tech Dairy Management program and are completing bachelor of science degrees in Agribusiness Management. They have taken a wide range of courses across the College of Agriculture and Natural Resources that help them develop a foundation of knowledge needed to evaluate a dairy operation. Only then can coaches add tools into the students' toolbox necessary to perform a deep dive into a specific dairy farm's performance. Co-coaches Joe Domecq, ANS academic specialist, and Don Martel, ANS assistant instructor, are experts in teaching these evaluation skills. Thomson, Domecq, and Martel bring over 110 years of professional experience in their given specialties.

A group of volunteers also help to prepare the team. Mr. Brian Troyer (ANS Alumnus) and Ms. Allison Pung (Ag Tech Dairy/Agribusiness Management and 2017 Dairy Challenge Alumna) both mentored the team on farm financial analysis. Mr. Nate Elzinga (Ag Tech Dairy/MSU Alumnus) mentored on feeding management and presentation skills.

New this year at MSU is a library created of previous national teams' presentations. The 2021 team could get ideas for slide formats and watch previous first place presentations. The team also received invaluable mentoring on presentation skills, handling question and answer sessions, and coping with the pressure from previous first place team members including Ms. Alycia Burch (Dairy Challenge 2018), Mr. Jared Sanderson, Ms. Monika Dziuba, and Ms. Ellen Launstein (all Dairy Challenge 2019).



Left to right: Miriah Dershem , Kristen Burkhardt, Beka Kriger, and Lynn Olthof

Last but not least, dairy producers in Michigan generously allow the team to use their operations for practice, including Mr. Jim Good and his team (MSU Dairy Cattle Teaching and Research Center), Mr. Craig Green (Green Meadow Dairy), Mr. Merv Seiler (S&T Dairy), Mr. Steve Cary (Cary Dairy), Mr. Kevin Lettinga/Mrs. Aubrey Lettinga-VanLaan (Walnutdale Dairy), and Mr. Jordan denDulk and his management teams (Willow Point and Meadow Rock dairies).

Dairy Spotlight

Annette O'Connor and Martin Manguel



Annette O'Connor

Chairperson of the Department of Large Animal Clinical Sciences

It is great to have the opportunity to introduce myself to the dairy community of Michigan because although I arrived in Michigan in Feb 2020, I don't know Michigan State or the State of Michigan anywhere near as well as I had envisioned yet. In 2021 I hope to get around more. I am a quantitative epidemiologist and veterinarian by training. Before working at Michigan State, I was at Iowa State University for 20 years. I did my training at the University of Guelph, the University of Queensland, and the University of Sydney. I'm also a fellow of the Australian College of Veterinary Scientists in Epidemiology. My doctoral thesis at Guelph was about assessing vaccines to control bovine respiratory disease. My research program is still focused on helping producers and veterinarians understand how effective antibiotics and vaccines are including in dairy cattle. Recently we have done work to determine how well teat sealants work in dairy cattle and comparing different dry cow therapies. I also work on vaccines to reduce pinkeye for beef and dairy cattle. Those who know my research know I haven't been able to find a *Moraxella*-targeted vaccine that works on the farms yet - but I'm still looking!

I am very interested in maximizing the value that society realizes from investment in research.

I work with researchers to improving their understanding of study design, appropriate analysis, comprehensive reporting, and appropriate synthesis of research. I have been fortunate in my career to work with Dr. Jan Sargeant, a colleague from the University of Guelph, to write several reporting guidelines to help researchers provide comprehensive reports of trials and observational studies. Those reporting guidelines include the REFLECT statement published in 2010 for randomized controlled trials and STROBE-Vet Statement published in 2016. These reporting guidelines are compiled at the MERIDIAN network (<https://meridian.cvm.iastate.edu>), a compilation of reporting guidelines related to animals. These efforts are part of a significant community effort to improve the accessibility of research in agriculture. The other area I work in a great deal is research synthesis, mainly systematic reviews and meta-analysis. These are formal ways to synthesize research to save veterinarians time by transparently compiling research. I host a website where people can learn about and register systematic reviews (www.syreaf.org). Apart from research, I am a bike commuter and enjoy playing tennis, although I am not particularly good, and I had a pet kangaroo as a child growing up in Australia.



Martin Manguel

Dairy Extension Educator

I grew up working alongside my grandfather on the family farm in Puerto Rico. Long days of farm chores were not enough to derail my interest in animal agriculture. After high school, I earned my Bachelor's degree in Biology from the University of Puerto Rico, where I also took part in several research opportunities. Some of these projects took place at MSU, where I worked with researchers such as Dr. Lorraine Sordillo, Dr. Andres Contreras, and Dr. Vengai Mavangira, who aside from great knowledge in science provided guidance on the "Spartan Way"! This new love for Green and White led me to enter the Animal Science Master's program working with Dr. Michael VandeHaar on dairy nutrition research focusing on the feed efficiency of lactating dairy cows. To stay close to a farm, I worked at the MSU Dairy as a milker and animal caretaker during my MS program. I earned the graduate student teaching award from the department, which solidified my interest in education. I wrapped up my MS program with presentations at the Tri-State Dairy Nutrition Conference and the national ADSA conference, where I earned 1st place in both masters student competitions.

I started in Extension in 2017 where I currently cover the west side of the state and serve as the co-chair of the Extension dairy team. I believe that having optimal farm procedures, and

how we train employees to follow them, is what ultimately determines the success of a dairy. For this reason, I focus heavily on developing people into successful employees through practical hands-on training programs. This includes milkers, feeders and mid-level managers. Training focuses on understanding the science behind best practices, detailed approaches to the process, and their importance within the dairy operation. Aside from training the protagonists, I also spend time evaluating farm procedures to determine recommendations to increase efficiencies. This primarily includes parlor performance evaluations and feed center evaluations. On the research front, I focus on practical on-farm projects that directly affect farms and provide valuable data and information to make decisions. When not helping farmers improve their operations, I focus on raising my own herd of three energetic boys alongside my wife in the west side of the state.

News & Updates

All things dairy at MSU

Understanding consumer preferences for gene-edited food

Valerie Kilders' first project, in which she collaborated with her advisor, Assistant Professor Vincenzina Caputo, combined research on consumer acceptance of gene-editing with animal welfare perceptions. Previous literature identified animal welfare as highly important to consumers and showed that negative impacts on animal welfare are among the main consumer concerns when evaluating the genetic engineering of food. A new gene-editing application has the ability to actually increase animal welfare by preventing the growth of horns in dairy cows, thus eliminating the need for a painful dehorning process. Kilders explored how consumers' willingness-to-pay for milk from these genetically dehorned cows changes depending on the information given to the respondents using a hypothetical choice experiment.

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Field Crops Virtual Breakfast Series kicks off 2021 growing season



Each year, farmers have a sense of anticipation, excitement, joy, anxiety and relief as they prepare for the new growing season. Farming is a profession that requires a certain amount of faith concerning things beyond their control such as weather, potential pests and crop prices. To address potential issues and concerns during the growing season, Michigan State University Extension will host the free Field Crops Virtual Breakfast Series every Thursday from 7-7:30 a.m. through Sept. 23, 2021 via Zoom. This weekly webinar meeting will be the fourth year that farmers, agribusiness personnel and others interested in agriculture can interact with MSU Extension specialists and educators to get answers for their questions.

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“Outstanding” USDA grant to expand MSU’s Food Systems Fellowship program

A USDA Research and Extension Experiences for Undergraduates grant submitted by Dr. Ángel Abuelo, assistant professor of Cattle Health and Wellbeing for the Department of Large Animal Clinical Sciences, was ranked as “outstanding” by USDA’s National Institute of Food and Agriculture and will be funded later this year.

“This grant will enable us to support and expand our already-successful Food Systems Fellowship Program,” says Abuelo, who also directs the Program. “We’ll provide 50 pre-clinical students with first-hand experience in food supply veterinary medicine research and extension in academia-, government-, and industry-based summer internships.”

By Emily Lenhard

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COVID-19 vaccine videos for agriculture workers in English and Spanish



Information about the vaccine can be critical for reaching high vaccination rates, and therefore important for protecting the population against the spread of COVID-19. In order to provide basic information about the COVID-19 vaccine and the vaccination process, Michigan State University Extension has created a video, available in English and Spanish, for agricultural workers. Additionally, a video tutorial in Spanish was created that goes over different options and the necessary steps to obtain a COVID-19 vaccine appointment. The videos are short and the links to the videos can be easily shared via text or email. *By Paola Bacigalupo Sanguesa and Faith Cullens*

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News & Updates

All things dairy at MSU



Danielle Ufer David L. Ortega

Do consumers care about redundant milk labels?

The consumer eye has increasingly turned towards production traits like improved animal welfare standards or the absence of genetically modified organisms (GMOs). Improving supply-side communication can be critical to meeting changing demands. Labels placed directly on product packaging are a part of key strategies to communicate with consumers. Some labels popping up in grocery stores, especially in the dairy aisle, redundantly point out things like “Organic is always non-GMO,” information which is theoretically already captured in the USDA organic label on its own. Since these labels don’t communicate any information that isn’t already present in the “comprehensive” USDA organic label, we wanted to investigate whether these redundant labels were actually valuable to the consumer and, if they were, whether that value persisted even after the consumer was informed and understood the redundancy. In our new article, recently published in *Applied Economic Perspectives & Policy*, we do just that.

To study consumer reactions to these redundant labels and whether they were valuable, we went to a local Michigan grocery store to find some milk consumers. Using a short survey and an economic experiment conducted right next to the dairy case, we elicited consumers’ willingness to pay for a half-gallon of milk with various labeling schemes. These schemes included redundant labels on USDA organic milk highlighting the non-GMO or animal-friendly traits of the milk. Using an experiment, we estimated consumer values both before and after telling them about the labels’ redundancy. In both cases, we found that the redundant labels were indeed valuable, with consumers willing to pay a premium even greater than they would offer for organic milk without the redundant label. On average, redundant labels increased the premium consumers were willing to pay for an organic half gallon of milk by \$0.28 to \$0.32, or about an additional 27% to 33% over the organic label’s premium on its own.

Taking things a step further, we used the data from our grocery store study to simulate the market shares of these different labeling schemes to see if these redundant labels could effectively recapture any share lost to products that provided fewer traits than the comprehensive label. Based on our data and the modeling assumptions we make, employing a redundant labeling strategy can help organic industry participants recapture 3 to 7% of the market from products that only have one of the many traits organic provides (specifically, non-GMO or animal-friendly characteristics). Overall, our study found that redundant labels can be an effective marketing strategy, both in communicating effectively with the consumer and capturing lost market share.

We identified two types of consumers with unique behavior relative to food labels which can change the way marketers use labels. The differences became clear as we found that value persists for redundant labels for some, but not all, consumers before and after making them aware of the redundancy. This indicated that some consumers simply do not know what the organic label entails and some do, yet still value the reassurance provided by that redundant label’s presence. This can shape labeling strategies in the future by considering what is essential to the consumer when they see a label on a food product. It also indicates that informational or educational campaigns for comprehensive labels can still help some consumers and should not be abandoned. Our results also point to a potential opportunity to rethink how the USDA organic program markets and labels products. The current label may not be sufficient to communicate its value to consumers effectively.

The dairy industry is susceptible to consumer demands. In recent years several processors, in particular yogurt makers, have aimed to increase non-GMO dairy product availability and sales, despite a well-established organic dairy industry. This can create multiple instances in which a redundant labeling strategy may be essential to reducing consumer confusion and holding on to a contentious market share for organic producers and processors. Finding the optimal communication strategy will be especially important as the dairy industry looks to reverse the long-term trend in decreasing beverage milk consumption, and redundant labels may be a key component.



News & Updates

All things dairy at MSU

Dairy industry stakeholders provide input to Deans of Agriculture and Veterinary Medicine

The past year has been a challenging time for many aspects of MSU's work, from undergraduate teaching to Extension programming. Even the beloved MSU Dairy Store operations had to be paused for much of the past year due to the lack of students and other customers on campus. These disruptions to the work of the university have led many stakeholders to ask about plans for resuming normal operations.

These conversations presented an opportunity to seek input from dairy industry stakeholders in Michigan to guide program evolution as we emerge from the pandemic. After reaching out to dairy producers, advisors, veterinarians, and processing industry representatives who have engaged with MSU in the past, the Dean of the College of Agriculture and Natural Resources, Ron Hendrick, and the Dean of the College of Veterinary Medicine, Birgit Puschner, hosted a listening session on March 9.

During the session, stakeholders heard updates from a variety of units with dairy programs, followed by breakout sessions to discuss programmatic needs in teaching, research, and extension mission areas. These breakout groups generated over 160 specific comments on the direction of MSU dairy programs. Follow-up analysis of these comments generated the following key themes, in order of the number of comments per theme:

1. Curriculum and Hands-on Learning

Undergraduate and professional programs need to emphasize practical knowledge

2. Technology and Data

Develop educational efforts to aide technology adoption and assist with decision-making

3. Consumer Demand and Confidence

Help reassure consumers that dairy products are safe, sustainable, and healthy

4. Antibiotics/Prevention

Work to ensure continued efficacy of antibiotics and understanding of these strategies among consumers

5. Sustainability

Continue to develop methods to lessen the environmental impacts of dairy production and communicate progress to consumers

6. Feed and Nutrition

Complement controlled research with field surveys and economics of dietary strategies

7. Reproduction and Longevity

Build on strengths in reproduction to address genetic and management approaches to improve productive life of cows

8. Students Need Soft Skills

Help students gain broader skills necessary for success in the industry

9. Student Recruitment

Make a concerted effort to attract students to dairy programs using technology as a draw

10. On-Farm Outreach Visits

There's no substitute for face-to-face discussions

11. Employee Training

Human resources is among the most critical factors for a successful dairy and training is needed for both supervisors and employees

12. New Dairy Facility

A modern facility is needed to educate consumers and students about today's industry

13. Continued Learning Opportunities

Lifelong learning is key to success, and MSU can provide resources

14. Communication

Research needs to be communicated to the industry, including why the work was done

15. Applied and On-farm Research

Demonstration projects aid in adoption of basic research findings

Dairy faculty and staff have already reviewed these themes in several meetings, and we are working on a detailed assessment of where we stand with respect to these needs. In upcoming issues of the Spartan Dairy Newsletter, we plan to highlight ongoing efforts related to each theme, including the articles on the next four pages of this issue. More importantly, we will keep these points front and center when planning curriculum updates, research and Extension programs, and hiring needs.

We ask that you hold us accountable for following up on these themes. Furthermore, if you did not have an opportunity to provide input during the listening session, we would love to hear from you. Please reach out to Barry at bjbrad@msu.edu or Dru at dnmontri@msu.edu. We look forward to partnering with the Michigan dairy industry to strengthen our state!

By Barry Bradford and Dru Montri

News & Updates

All things dairy at MSU



A year of changes at the MSU Dairy Farm



One year ago, Jim Good stepped foot on the MSU Dairy Teaching and Research Center for the first time in decades - as the new farm manager. Jim, an MSU graduate, took the job during the early months of Covid-19 when MSU was not allowing in-person interviews. Thankfully, the job was a good fit for Jim and he got right to work. The changes at the dairy in the last year are quite impressive!

A management oversight committee had been formed a few months prior to Jim starting and had already put several changes in motion that Jim was able to see through. One such change was moving heifers to Kellogg Biological Station from 8 months of age to 22 months. This allowed the farm to renovate a barn to house 80 lactating cows in free-stalls. Moving youngstock that were rarely involved in teaching or research off campus allows us to meet our mission more effectively as we do not have enough land to grow all of our crops or to spread our manure on South campus.

Because the MSU Dairy Teaching and Research Center does so much research that involves measuring individual animal intake, these cows are housed in tie-stalls and are labor intensive. When research is busy, like it is now with six projects happening concurrently, all 163 tie-stalls will be used. Cows are hand fed and feed refusals later picked up and weighed. The dairy has recently added two mechanized feed carts to make this process more efficient and to save the backs of employees!

Current Statistics

Milking cows	250
Yield	96 lb/day
Fat	4.0%
Protein	3.2%
SCC	65,000

Over the last 12 months, Jim and his team have heavily focused on putting up the best feed possible. To do this, the farm moved away from using upright silos (which were also very labor intensive) and put in a pad to store more bagged silage. We utilized a bigger forage bagger than before, allowing us to put up feed quicker. The biggest impact was realized when Burnips Equipment donated the use of a self-propelled chopper. This equipment provided optimally processed corn silage very quickly!

Additionally, the farm switched from milking twice daily to three times. All these improvements resulted in not only major labor efficiencies but also a huge production improvement! Cows are up about 20 lbs of milk per head/day and herd health has also improved.

Even more improvements are on the horizon for the MSU Dairy. With such high research demand, we purchased 50 cows in the spring of 2021 to help meet the needs. The extra milk put us over our bulk tank capacity, so we are currently adding another tank to store milk. *By Faith Cullens*



Improvements to Cow Comfort

- Renovated barn to add 80 large free-stalls
- Modified the existing free-stalls to give cows more lunge space
- Renovated the down cow pen
- Upgraded the treatment chute and added a handling area
- Added 40 ft of water trough in parlor return
- Regrooved concrete as part of hoof management plan



Breaking Update: Fire destroys feed barn at MSU Dairy

A fire broke out in a feed barn at the Michigan State University Dairy Cattle Teaching and Research Center at 4075 N. College Road on South Campus. At approximately 7:45 p.m., Saturday, May 15, 2021, a student employee called 911 and East Lansing Fire Department responded.

Anne Tunison, an animal science major in her fourth year, was in the barn feeding calves when she smelled smoke and noted flames coming out from under the feed barn, situated between 12 silos. The feed barn was fully engulfed. After calling 911, Tunison began moving livestock out of the area.

No people or livestock were injured. No current research was hampered. Milking continued according to schedule. The feed barn was destroyed in the fire.

To view full article, visit: canr.msu.edu/dairynewsletter



Aftermath of fire at the MSU Dairy Teaching and Research Center

News & Updates

All things dairy at MSU

NEW this Fall at MSU...

A Bachelor's Degree in Animal Science with a Dairy Industry Concentration

The Dairy Industry Concentration is a program for students who aspire to work on a dairy farm and businesses that support dairy production. This program includes the science core, numerous courses in management of dairy animals and farms, and various electives depending on the goals of each student.

Are you interested in learning more about the new Dairy Industry Concentration? We had the chance to interview Dr. Joe Domecq, Coordinator of Dairy Education within Animal Science, to answer some questions about this great opportunity.

Q: What is the Dairy Industry Concentration?

A: The dairy concentration provides an opportunity for students to gain practical, hands-on skills and knowledge needed to succeed in many of the career opportunities that are available in the dairy industry. The courses within the concentration are designed to provide students within the Ag Tech and Bachelor of Science programs in Animal Science practical and scientific educational experiences. Courses and experiences that combine practical experience, scientific theory and business principles are all part of the Dairy Industry Concentration experience.

Q: Why was the Dairy Industry Concentration developed for Bachelor of Science students?

A: The background of students enrolling in the bachelor's degree has changed in the last 20 years. Fewer students have a practical dairy background or are raised on a dairy. There is a need to provide practical education and experiences for these students. Students need to be able to apply the scientific concepts they learn in various animal science courses. For example, understanding the biosynthesis of milk in the udder is important, but students also need to understand and experience the process, challenges, and economics of harvesting milk in a modern parlor or robot. There are many other examples of where practical knowledge and education enhances scientific course material. Furthermore, students need to be able to apply business decision-making principles, incorporating data from the latest technology like animal sensors, to animal biology.

Q: How does the Dairy Industry concentration impact the Ag Tech Dairy Management program?

A: The Ag Tech Dairy Management program will remain an important part of the Department of Animal Science. Students who do not want to attend school for four years can attend for three semesters and obtain a practical, short education in dairy production and management.

The larger impact for the Ag Tech program is the educational opportunities that are available to graduates after the completion of Ag Tech. There are now new dairy courses and educational opportunities that are part of the Dairy Industry Concentration. More skills and depth of dairy and science knowledge is available for those who decide to transition into the four-year program.

Admission to the Ag Tech dairy program will remain the same and separate from admission from the Bachelor of Science program. Almost all the current Ag Tech courses and experiences, including internships, will remain the same. The pathway to transfer from Ag Tech to the Bachelor of Science program has been clearly defined and almost all of the credits earned in Ag Tech will transfer to the Bachelor of Science program. Students can complete the Ag Tech and bachelor's degree programs in four years.





Q: What career opportunities are available to students upon completion of this concentration?

A: There are many career opportunities in the Michigan dairy industry, and there are not enough qualified students to fill the jobs that are currently available. As dairies become larger, the opportunities to work in specific areas of the operation increase, with the ability to develop deep expertise, supervise employees, and solve problems. Those areas include but are not limited to maternity, calves, youngstock, reproduction, feeding management, parlor operations and human resource and development. The traditional positions of farm owner, herd manager and herdsman still exist as well.

There are many businesses that support dairy operations, and many positions are available within these organizations. Experts in dairy nutrition help farms with everything from forage production to feeding management. Dairy operations also utilize a tremendous amount of technology, including robots and animal sensors that collect data; people with the ability to utilize this technology and apply practical cow knowledge are in great demand. Veterinarians also play an important role in dairy operations and pre-veterinary students would benefit from completing the Dairy Industry Concentration.

Q: What outside of the classroom learning activities are part of the Dairy Industry Concentration?

A: There is a diverse team of instructors involved in teaching and leading activities inside and outside the classroom. This faculty possesses many years of experience in the dairy industry and/or conducting dairy research, and they bring this experience to teaching and advising efforts. Students interested in research can gain experience in the field or lab working with internationally known scientists. Students can become members of successful Dairy Challenge or Dairy Judging teams. MSU also has many clubs within the Department of Animal Science and across campus. Study abroad programs related to dairy production also are available. Finally, students can complete internships across the world in fields related to dairy production.

Q: Where can I find more information?

A: Specific information and courses can be found at tinyurl.com/sf4xuy3d. Interested current and future MSU students should contact Dr. Joe Domecq for more information.

Meet the Dairy Education Team



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Dairy Nutrition

Adam Lock
Dairy Nutrition

Jim Good
Dairy Farm Manager

Don Martel
Feeding Management

Zheng Zhou
Dairy Nutrition **10**

Management Tips

MSU Dairy Extension Team



Charles Gould Ramjee Ghimire

An assessment of manure-based compost markets in Michigan

The goal of this study was to generate a report that farmers can use to make informed decisions about making compost from manure and other agricultural byproducts to increase farm income by selling compost to consumers. The study and report update a similar effort that was conducted in 2005.

In this descriptive study, researchers surveyed Michigan equine operation owners, farmers, landscapers, and nursery and greenhouse operators. The surveys differed across industries. For example, farm, landscape, and greenhouse and nursery respondents were asked questions related to their operations, preferred compost specifications, compost manufacturing and use, and demographics. Owners of equine operations were asked about their businesses, bedding and manure management preferences, and demographics. The survey instruments included Likert-type, dichotomous, multiple answer, and open-ended questions.

Findings - The analysis of the survey data show that while farmers, landscapers, and greenhouse and nursery operators are familiar with compost, many are strongly reluctant to use it because they don't see its value. When asked what compost specification was considered most important, landscapers and greenhouse and nursery operators indicated "consistent product quality" while farmers indicated "cost/quality relationship." "Cost/quality relationship" and "consistent product quality" were also the most important compost specification identified by farmers and landscapers, respectively, in the 2005 compost marketing study (Gould, 2005). In the 2005 study, "consistent product quality" was ranked the second most important specification behind "nutrient availability" for greenhouse and nursery operators.

By Charles Gould and Ramjee Ghimire

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Feeding for fertility

Nutritionist vs. reproductive physiologist sparring matches are among the greatest pleasures of working in an animal science department. "Our work accounts for 60% of the input costs on a dairy," we nutritionists like to point out, "so obviously what we do is the most important." The predictable retort from the repro side: "Good luck having cows to milk if they never get pregnant!"

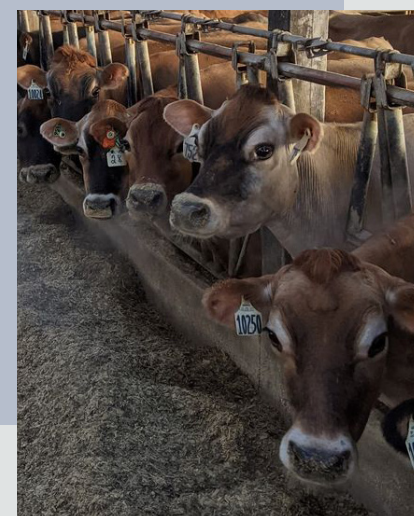
One of my favorite aspects of working in animal science is that we can work toward an integrated understanding of the animal – and not just the inner workings of the cow, but also how management and physiology intersect. These integrative perspectives are critical in dairy cattle fertility. Genetics, health, breeding programs, environment - and yes, nutrition - all play key roles in setting cows up to have a fair shot at becoming pregnant.

Nutritional influences on fertility remain an area needing more research, but we nonetheless have a growing understanding of critical nutritional variables that contribute to fertility in dairy herds. For the sake of brevity, I will bypass the discussion of the importance of fat-soluble vitamins (especially vitamin A) in reproduction, which has been established for nearly 100 years.

Essential fatty acids

Although fats typically comprise only about 5% of a dairy cow's diet, this component of the diet has received a lot of attention lately. We now recognize that fats do more than provide a concentrated source of energy – they also serve as "bioactive" nutrients. A bioactive nutrient has the capacity to change the function of the animal. Some fatty acids have been recognized as playing a uniquely important role for many years because they serve as the starting material for producing key signals in the body, including prostaglandins. These essential fatty acids, typically grouped into omega-3s and omega-6s, must be in the diet to support the cow's normal physiological function.

By Barry Bradford



Management Tips

MSU Dairy Extension Team



Phillip Kaatz

Details for excellence in agriculture

In every part of agriculture there are farms and farmers that excel in what they do. Have you ever asked yourself why there are fewer and fewer farms each and every year? Farming is a tough business. The markets continuously change and if you do not keep up, your farm could be terminal. Year in and year out, the best farmers continually separate themselves from their peers by having above average yields, high quality crops or livestock, seek to do things in an environmentally responsible way, and ultimately achieve above average profitability in their farming operation.

I have asked many farmers, what is their secret? How do they always seem to hit it right? The answers varied between farmers, but there seems to be a common theme or thread between the top and the rest. The reasons below are not in any particular order but can be adapted by any farmer that is open to improvement.

Reason No. 1

Farmers that do well have a plan that is written down, and as my mother used to tell me, "Have a plan and stick to it!" They take the time to thoughtfully look over the plan on a regular basis. Many have great intentions when formulating a plan, but then fail to follow up and make any necessary adjustments due to changes that might have occurred. It can be difficult to stay on task and look at the long-term strategy without getting sidetracked. Remember, it's a marathon, not a sprint. To put this into words, keep your eye on the prize and stay focused!

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Summer's hot weather will cause heat stress in dairy cattle

As dairy farmers in Michigan know all too well, our summer can be hot, humid, and downright unbearable for cattle. As the temperature and humidity both rise, so does the risk for heat stress in dairy cattle. Heat stress occurs when outside influences cause a cow's body temperature rise above the normal temperature of 100.9 – 101.5 degrees Fahrenheit. When this happens cows are no longer comfortable and not able to reach their production or reproductive potential. Heat stress can occur at temperatures as low as 70° F with humidity over 65 percent. In Michigan, this can mean that your herd could be affected as early as April and as late as October.

Heat stress can have varying effects on cows, such as reduced dry matter intake, reduced milk production, and delayed reproduction. Rumination, lactation, and high feed intake result in dairy cattle having higher body temperatures from internally produced heat. As a result, the first instinct of a heat-stressed cow is to consume less feed in order to lower her body's workload and temperature. A dairy cow will also increase her standing time in an attempt to cool her body down by increasing air surface area. It does not take long after the decline in feed intake and decreased lying time for milk production to decrease. During the hottest times of the year cows have been known to drop up to ten pounds of milk per day. Milk production and fertility will start to decrease when a cow's body temperature reaches 102.2° F. When the heat stress become so great that the cow's body temperature increase to 104° F an embryo in the first three days of conception will not develop.

By Marianne Buza



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Management Tips

MSU Dairy Extension Team



Phil Durst

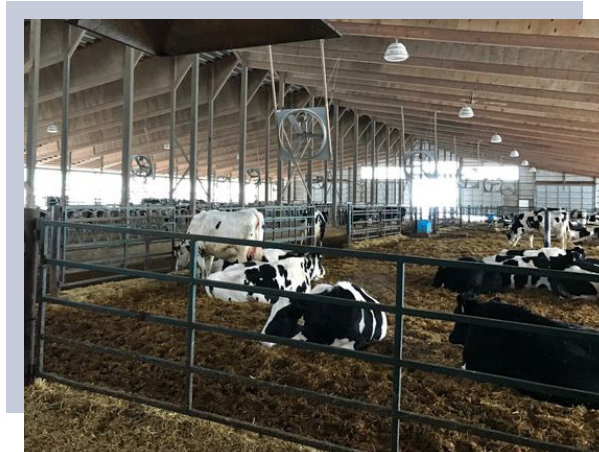
Calving area changes led to better results

What has been a positive change you have made in transition cow management? When that question was asked of Norm Buning, of Buning Dairy in Falmouth, Michigan, Buning talked about their calving pen arrangement because it reduced problems; thereby improving performance at this critical time.

Michigan State University Extension educators Phil Durst and Stan Moore visited with Buning for a Virtual Coffee Break podcast conversation about transition cow management. The calving pen arrangement was a change that considered the cows, the labor, and the results.

Buning shared his consideration for the social aspect of cows. Cows are herd animals that generally prefer to be with other cows, except when they prefer to be alone. Often, they prefer to be alone at calving time. Sometimes, we meet that need with individual calving pens. Yet, as the herd grew, individual calving pens became problematic.

Their close-up pen was a head-to-head free stall pen in a four-row, drive-through barn. They decided to take out the stalls on the back side, break out the curb and pour new concrete, and create a bedded pack area. As a result, the pen is half free stalls on the feed alley side and half straw bedded area on the outside wall. This arrangement provides benefits of efficiency of housing close-up cows in free stalls and the extra area and opportunity for solitude for cows that are calving. There are also headlocks that enable them to catch cows for treatment or handling.



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Managing corn silage harvest and feed bunk for nutrient retention

Superior practices for harvesting, packing and feeding silage are essential to the financial status of dairy farms. The results of the corn silage harvest will impact the farm for a whole year or more. Retaining the valuable nutrients in corn silage is important in feeding for high production in dairy cows and in protecting the environment.

Harvesting

Whole plant moisture is the best method to determine when to start chopping. Kernel milk line is not the best indicator of corn silage maturity. Digestibility of neutral detergent fiber (NDF) and starch is closely linked with whole plant moisture (or dry matter). Whole plant dry matter between 30-35% indicates the digestibility of NDF and starch are optimal. It is important to harvest when NDF digestibility is high because a 1 percent unit increase in NDF digestibility is associated with an increase of 0.55 lb/day of 4% fat corrected milk. Storage type will determine which moisture level will result in optimal fermentation.

If silage is harvested too wet, fermentation will be dominated by undesirable clostridial fermentation which may result in poor animal intake and performance. Silage put up too wet will also seep, leaching valuable nutrients in the environment. If silage is harvested too dry, starch digestibility will be lower, silage will be difficult to pack, too much oxygen will be present, and can result in heating and molding of the silage.

By Faith Cullens and Craig Thomas

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Research Drill Down

Paola Bacigalupo and Ron Erskine

Challenges in the milking parlor

Farms with at least 1,000 cows account for more than half of all cows in the U.S. dairy herd. More than two-thirds of the milk supply is produced by herds with more than 500 cows. To attain better milking productivity, dairy producers have invested considerable capital into milking systems. Depending on factors such as herd milk production and dairy markets, the timeline for the return on investment varies, which adds considerable pressure on farm finances.

In addition to herd size, milk production per cow has also increased, but milk is still harvested the way it has been for a century—prepping cows to stimulate oxytocin release and applying vacuum to the teat end within a double-chambered teat cup. Also, milking protocols that help prevent mastitis have become more accepted. Thus, the connection between the cow, producer and machine has been beneficial for the dairy industry and has allowed more milk to be harvested, with less labor, and better quality.

The key force that drives milking parlor operation for many dairies is the number of cows that are milked through the facility each day. Thus, the parlor is one of the key “bottlenecks”. Many producers try to find the balance between “parlor efficiency” and growing their operation. However, this has created other challenges, most notably employee availability, training and engagement due to fast paced, repetitive milk-harvesting tasks, as well as the demand for higher milk quality, and consumer concerns over the welfare of dairy cattle.

For many dairy producers, “keeping the cows on schedule” through the parlor is a frequent concern. This is especially the case where milking times for groups of cows are synchronized with cleaning of pens, feeding and other needs such as breeding. Most herds track parlor efficiency—for example, turns (loads) of the parlor per hour, number of cows milked per hour, number of

cows milked per employee-hour of work, or milk harvested per hour (or shift, or day)—as their key measures of milking success. Thus, this is the primary goal for many dairy herds when it comes to milking cows. But are we missing something?

Milking efficiency vs. parlor efficiency

Milking efficiency is the percent of time that milk flows near maximum while a unit (cluster) is attached to a cow. For example, if a milking unit is attached for 5 minutes, and milk flows for 4 minutes and 45 seconds, her milking efficiency is 95% (285/300 seconds). When milk isn't flowing while the unit is attached, it creates high vacuum on the teats, which disrupts blood flow, and may decrease milk quality and milk yield. There are two basic causes for poor milking efficiency: 1) milking routines that cause delayed milk letdown—often called bimodal milk letdown, where the milk flow starts, then stops, then starts again—and, 2) overmilking (Figure 1). Both of these problems can leave cows ‘high and dry’, and expose teats to high vacuum levels, which damages the teats and disrupts milk flow.





Ideal milking efficiency



Poor milking efficiency due to overmilking



Poor milking efficiency due to delayed milk letdown

Figure 1. Blocks illustrating different milking efficiencies. Each block represents an entire milking event, from unit attachment (left edge of the block) to unit detachment (right edge of the block). Dark green represents normal time with low milking flow at the beginning and at the end of milking, light green represents time with high milk flow, and red represents time with low milk flow due to overmilking or delayed milk letdown.

A minute delay equals seven pounds tossed away

Teat stimulation before milking—rubbing the udder, stripping, automated brushes, or drying with towels—activates nerves in the udder to carry an “electric signal” to the pituitary gland in the brain. The pituitary then releases oxytocin into the blood and to the udder. It takes 1 to 2 minutes to reach optimal oxytocin levels, which forces muscles that surround the milk ducts to ‘squeeze’ milk to flow to the teats. The two important points about oxytocin function are 1) giving enough teat stimulation (at least 10 to 15 seconds of actual physical touching) and 2) waiting for the latency period (more commonly known as ‘lag time’), the time interval from when teats are first stimulated until the cluster is attached. Unfortunately, many herds sacrifice adequate pre-milking preparation to enhance cow throughput in the parlor. In fact, in our study of Michigan dairy herds,

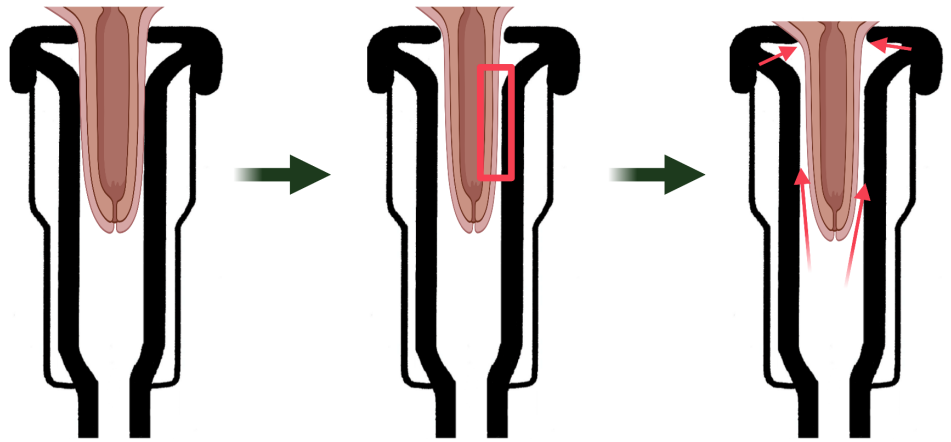
we found that larger herds tended to have: 1) greater cow throughput, 2) greater workload on employees, and 3) half the stimulation time as compared to smaller herds (see table). Not surprisingly, herds with less stimulation during the milking prep are more likely to have bimodal milk letdown. On average, 25% of cows within a herd had bimodal milk letdown. For one in six herds, more than half of their cows had poor milk letdown. Is this the new normal?

Why do we care if cows have a bimodal milk letdown? During bimodal letdown, teats are exposed to high levels of vacuum for approximately 45 to 60 seconds—or even longer, and it is not just the teat ends. The lack of milk flow during bimodal letdown causes the teat barrel to become thinner, which leads to a poor seal between the teat and the liner that allows high vacuum to “leak” into the mouth piece chamber, a space where there is normally low vacuum (Figure 2). High vacuum causes skin damage, blood congestion, teat swelling

Mean milking variables by herd size		
n = 64 herds; P < 0.05		
	< 300 cows	≥ 300 cows
Stimulation (s)	16.8	8.7
Cows/Operator/hr	36	47
Units/Operator	8.7	12.4
Shift(herd) Length (h)	3.5	6.8
Lag Time* (s)	110	97
* P = 0.08		

Moore-Foster et al., JDS 2019

Figure 2. When there is no or low milk flow, the teat barrel gets thinner. This leads to poor fit between the teat and the liner, and that allows the high vacuum to reach the mouth piece chamber.



and shuts down the teat canal, reducing milk flow. This is painful for the cow, and she'll respond by "dancing", or kicking off the milking cluster. Even though the milk flow may eventually begin, cows with bimodal milk letdown have the same milking times as cows with normal milk flow. What does this mean for milk yield? If the delay in letdown is about 30 seconds to a minute, 3 pounds is lost during that milking. If the delay is over a minute, seven pounds. The longer the duration of time that it takes for milk to start flowing after cluster attachment, the more milk is lost from that milking and the more it impacts your bottom line. The more cows in the herd that have bimodal milk letdown, the more milk is lost.

What about the employees?

Ask any dairy producer or herd manager what comes to mind about milking their cows, and labor availability and protocol compliance often

top the list. No one likes to be rushed, cows or employees, but as herds are getting larger, the push to get cows through the parlor seems to be on the rise. What effect does bimodal milking have on the employees? Simply, it makes their job more difficult. Trying to prep and milk cows that are kicking units off, stepping, and not wanting to come into the parlor means milkers have to spend more energy and time to complete their job. Frustrated workers often have to reattach units or place the take-off on manual to deal with the "angry" cows. Everyone knows what it's like to milk a new heifer in the milk string. What if half of your cows act that way during milking? Also, proper teat cleaning and detection of clinical mastitis become issues in this sort of approach to udder prep. In these situations, employees can see themselves pressured to follow the milking protocol while being rushed to perform their job by the farm management, something that sometimes can be impossible to do. In addition, employees are being asked to maintain



good milk quality and meet the milking schedules. All this can lead to high levels of frustration that can trigger disengagement and protocol drift, or can even push the employees to leave their jobs.

Future research at MSU

To have a better understanding of the bimodal milk letdown issue, the MSU College of Veterinary Medicine and MSU Extension are working on a research project that will evaluate the impact of bimodal milk letdown on milk production in the long term. The milking records of cows from four different herds will be tracked for seven days. We will look at the milk flow records from parlor software's and determine how many of those milking events have bimodal milk let down, and will assess if milk production is affected. On a second research project will explore how employee training can help to decrease bimodal milk let down.

So how are your cows milking? Have you watched cow behavior after cluster attachment lately? Does the flow stay consistent or does it stop a few seconds after the unit is attached? What do the teats look like when the units detach? There's the money, cow welfare and employee engagement on the line—is it worth it for you? Equipment dealers, milk quality consultants and your herd veterinarian can all be part of your milk quality team and together can optimize the milking experience for the farm, employees and most of all, the cows. What is the balance between parlor and milking efficiency? Compared to a simple measure such as, 'how many cows were milked through my parlor today', the impact of bimodal letdown seems vague. Historically, we believed bimodal letdown was undesirable because it increased the unit on time, or the risk of mastitis. Bimodal flow may reduce milk quality and teat health, but the impact on a herd is difficult to measure. Thus, like subclinical mastitis that is often overlooked compared to clinical mastitis, the impact of poor milking efficiency is often overlooked compared to parlor efficiency.

Adapted from an article recently published on Hoard's Dairyman

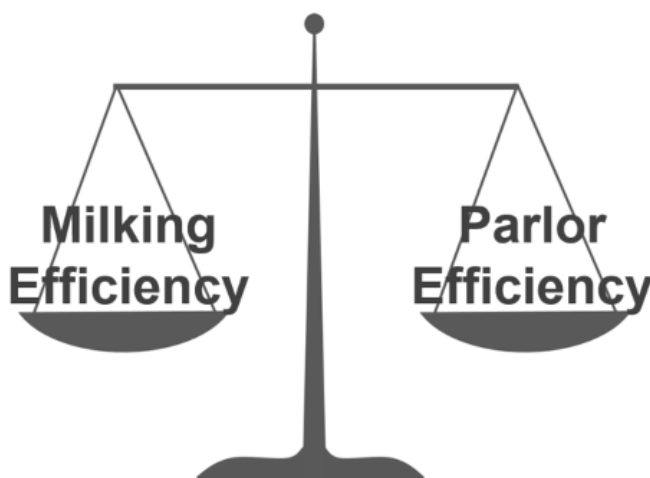


Figure 3. Farms should find a balance between milking efficiency and parlor efficiency to maximize parlor use, milk production, and cow wellbeing.

Meet the Authors



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Michigan Dairy Recognition

Shining a light on industry leaders

We need more cow vets: new MSU scholarship supports bovine medicine, dairy industry



To help address the national shortage of rural veterinarians, Gary and Carolyn Trimner donated \$50,000 toward scholarships to support veterinary medicine students who participate in the Michigan State University College of Veterinary Medicine's Food Systems Fellowship Program. With personal ties to the Program and a love for animals, Gary and Carolyn share how their lives led them to this generous act.

"We're immensely proud to do the scholarship," Gary says. "We're proud to support the vet school and the DVM students, as well as farmers and the future of the dairy industry." *By Emily Lenhard*

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Jim Reid appointed to the National Dairy Promotion and Research Board



Jim was appointed by the U.S. Department of Agriculture (USDA) to serve on the National Dairy Promotion and Research Board in November of 2019. Jim owns and operates Reid Dairy Farm with his wife, Pam and son Jeff. They milk 220 cows and are located a few miles away from Lake Huron.

The Reid family has always been passionate about promoting the dairy industry and educating consumers on farming and agriculture. They often host farm tours for school groups to share their dairy story. We would like to give a special thank you to Jim for representing Michigan as he serves on the National Dairy Promotion and Research Board!

Learn more about the Reid family: milkmeansmore.org

Wilson Centennial Farms receive Platinum National Dairy Quality Award from the National Mastitis Council



The Wilson family, from Carson City, were one of the six herds to receive a Platinum National Dairy Quality Award this year from the National Mastitis Council. When evaluating the finalists' applications, judges look into each operation "including the milking routine, cow comfort, udder health monitoring programs, treatment and prevention programs, strategies for overall herd health and welfare, and adherence to drug use and record keeping regulations."

Kudos to Wilson Centennial Farms on doing a great job with milk quality, as this is a well deserved honor!

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