

# Spartan Dairy

## Newsletter

Fall 2021 Vol.1 No.3



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Dairy at MSU



@DairyMsu



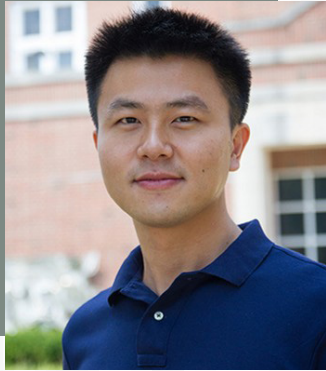
Dairy at MSU

To view the full newsletter online, visit: [canr.msu.edu/dairynewsletter](http://canr.msu.edu/dairynewsletter)



# Dairy Spotlight

Zheng Zhou and Marianne Buza Murawski



**Zheng Zhou:**  
**Assistant Professor**

I am beyond grateful to have the opportunity to connect with the Michigan dairy community. I started my position as an Assistant Professor in the Department of Animal Science at Michigan State University in 2019, and was only able to visit a few dairy farms in Michigan before the pandemic hit. For those I have not had the opportunity to meet, I hope this serves as a temporary introduction until we get to finally meet in person. I grew up in Wuhan (arguably the most famous city in China since 2019) and received my molecular nutrition training at Huazhong Agricultural University using monogastric animals as models. In 2012, I started working with dairy cattle during my PhD training at the University of Illinois, Urbana-Champaign. Before I started my position here at Michigan State, I was an Assistant Professor in Animal Sciences at Clemson University.

By training, I am an animal molecular physiologist with a broad background in animal nutrition and molecular physiology. A fundamental goal of my research program is to improve animal performance and health, and to uncover the underlying regulatory mechanisms responsible for these processes. In the past few decades, rapid advances in biotechnology have provided novel tools for the development and discovery of various strategies that improve human health and quality of life. However, in the animal science realm, we are just starting to take advantage of these new technologies. As a ruminant physiologist with a basic science background, I would like to apply these technologies to provide new solutions for practical problems related to animal health and performance in the dairy industry.

Currently, my group is utilizing these new technologies to identify and optimize nutrient supplementation that prevents or alleviates fatty liver in dairy cows. My team has also been working closely with Dr. Michael VandeHaar's group to understand how these new approaches can improve feed efficiency in dairy cows. Apart from research, I enjoy playing basketball and raising my one-year-old son together with my wife, who also works at Michigan State and studies nutrition in pregnant women.



**Marianne Buza  
Murawski:**  
**Dairy Educator**

I was born and raised in suburban Cleveland, Ohio. So how did I end up in Bad Axe, Michigan? My interest in animal agriculture goes back to my childhood and reading library books about the topic. I did not grow up in a rural area or on a dairy farm, and much to my displeasure, my family wouldn't move just because I wanted to live somewhere rural! Growing up in the suburbs has allowed me to have a unique perspective on the industry. To begin with, I had to find ways to gain livestock experience. I became interested in veterinary medicine, and I attended the University of Findlay in Ohio where I majored in Biology, Animal Science and Pre-veterinary Medicine. While in college I spent time with three large animal veterinary practices. From my time with them, I learned that dairy farms were my favorite clients to visit. I began to learn as much about the dairy industry as I could.

After college, I spent a year working on a 200-cow dairy in Litchfield, Ohio. I also found a place called Lake Metro Park Farmpark where I volunteered to teach families about modern dairy farming. I began to research careers in the dairy industry that appealed to me, and I kept coming back to Extension as an ideal fit. As I applied for master's degree programs, I looked for one with Extension opportunities, and I landed on a program at Penn State. My research advisor was Dr. Lisa Holden, who has an Extension-focused appointment. My masters research included looking at income over feed costs, byproduct feed use, and the use of teams to improve dairy farms. I was able to go with Dr. Holden to Extension meetings and farm visits, and she introduced me to other Extension professionals in the area who I was able to work with. By the end of my time in Pennsylvania, I was sold on working in Extension. Michigan State University offered me the dairy educator position in Huron County at the Bad Axe office in February 2015. So I packed my bags and became a Spartan!

In my time with MSU, I have developed an interest in many topics, but my primary focus now is animal welfare. I am certified by the National FARM program and teach many classes on the topic, including euthanasia with the use of a captive bolt gun and non-ambulatory animal care. My research interests have been around heat stress and cooling systems in Michigan. Currently I am developing some skills in farm finance analysis and succession planning. I worked with farms in Pennsylvania on these topics and I am currently working with farm management educators at MSU to become more proficient in these two areas. Succession planning especially is so important to the sustainability of the dairy industry, and I am looking forward to being a resource in that area.

# News & Updates

All things dairy at MSU

## CANR Alumni Association announces 2021 scholarship recipients

Each year the MSU College of Agriculture and Natural Resources (CANR) Alumni Association awards scholarships to students who demonstrate leadership and community service, possess effective communication skills, have a commitment to their chosen field of study, are well-rounded in their academic and non-academic pursuits and have a vision for their future career.

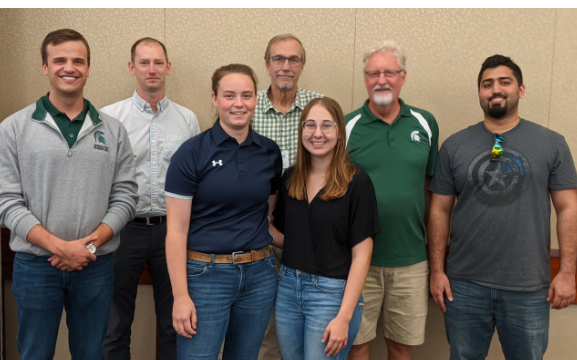
This year, two sub-committees met virtually to review scholarship applications for undergraduate students, graduate students and Institute of Agricultural Technology (IAT) students. The applicants selected were invited to move forward and participate in virtual interviews. The committees chose to award three \$1,000 scholarships to IAT freshmen, eight \$3,000 scholarships to CANR juniors and four \$3,000 scholarships to CANR graduate students.

[Click here to view full article](#)



## 8th edition of the Nutrient Requirements of Dairy Cattle releasing in December

The 8th revised edition of the Nutrient Requirements of Dairy Cattle should be released in December, with over 300 pages of details on optimal dairy cattle feeding. MSU faculty Mike Allen and Mike VandeHaar were part of this high-profile committee. The American Dairy Science Association hosted Discover Conference 40 in September as venue to explain and discuss the latest revision.



*Attending from MSU were (left to right): PhD student Kirby Krogstad, professor Barry Bradford, MS student Lynn Olthof, professor emeritus Mike Allen, MS student Katelyn Goldsmith, professor Mike VandeHaar, and MS student Muhammad Ibraheem.*

## Undergraduate researcher takes home ADSA honors

Maia Machiela won the American Dairy Science Association Undergraduate Original Research Competition at this summer's annual meeting. The title of her presentation was "Effect of feeding rumen protected methionine and lysine with or without an animal-derived source of rumen undegradable protein on performance of mid-lactation cows."

Maia graduated in May 2021 with a degree in dietetics; she worked in Dr. Adam Lock's lab group for three years and is now heading to the University of California at Davis for a PhD program studying lactation biology.



## Emergency response to accidents involving livestock online course offered by MSU Extension



First responders, law enforcement officials, animal control officials, and members of the livestock industry will benefit from this virtual training that provides them with the information and tools needed to respond to accidents involving livestock.

Animals are transported across the highways and roadways in the United States on a daily basis. Livestock production requires animal transportation throughout the growth phase and for marketing of animals. In addition, the exhibition industry has people traveling with animals to shows and events and there is a significant animal recreations industry throughout the country.

[Click here to view full article](#)



# News & Updates

All things dairy at MSU

## **New \$3 million investment to advance Michigan animal agriculture research, infrastructure**

EAST LANSING, Mich. – The Michigan Alliance for Animal Agriculture (M-AAA) has received \$3 million in new funding for research projects and infrastructure upgrades. With support from the Michigan Legislature and in partnership with animal agriculture industry organizations and Michigan State University, funding is included in the Michigan Department of Agriculture and Rural Development (MDARD) 2021 budget.

“Part of MDARD’s core mission is to protect public health, as well as the health of domestic animals, livestock and pets,” said MDARD Director Gary McDowell. “These grants are critical as we continue to move the needle on these key initiatives, while also providing the necessary research and infrastructure needed to make sound decisions, improve operations and ensure an efficient and sustainable agriculture, which everybody can get behind.”

Twenty-five new research and outreach projects are being supported with \$2.28 million, and the remainder is being used for renovations to the MSU Swine Teaching and Research Center, a critical component to funded research.

Established in 2014, the M-AAA supports research and outreach on behalf of Michigan animal agriculture industries, focusing on issues such as workforce development, environmental protection, animal welfare, infectious diseases, enhanced profitability and antibiotic resistance.

*By Cameron Rudolph*



## **New director of MSU Veterinary Diagnostic Laboratory named**

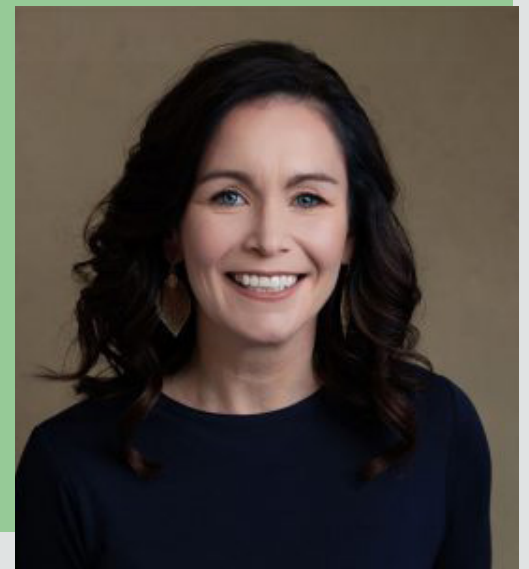
Kimberly Dodd, DVM, PhD, MS, has been named the director of the Michigan State University Veterinary Diagnostic Laboratory (VDL). She also is an associate professor in the Department of Pathobiology and Diagnostic Investigation. She will assume the role September 1, 2021.

Dodd comes to MSU from the United States Department of Agriculture’s National Veterinary Services Laboratories where she was director of the Foreign Animal Disease Diagnostic Laboratory on Plum Island, NY. Prior to that, she was a senior scientist at Metabiota, where she led efforts to enhance laboratory capacity in Africa. Her background includes working with high-consequence zoonotic diseases including Ebola and Rift Valley fever viruses, among others, as a guest researcher at the Centers for Disease Control and Prevention’s Viral Special Pathogens Branch. She has held adjunct faculty positions at Kansas State University and Iowa State University.

Dodd earned both her Doctor of Veterinary Medicine and PhD in comparative pathology from the University of California – Davis. She also earned a Master of Science degree in population biology from the University of Virginia.

Upholding and facilitating the VDL’s mission and vision, including promotion of its standards of excellence and adherence to quality principles, will be a key focus. Dodd also will represent the VDL in interactions with state and federal agencies, animal industry groups and agricultural organizations, and national and state associations.

*By College of Veterinary Medicine*



# News & Updates

All things dairy at MSU

## Great Lakes Regional Dairy Conference

Join us at the Great Lakes Regional Dairy Conference to connect with experts, farmers and others in the industry to gain knowledge on new tools, techniques and strategies to ensure your dairy thrives now and in the future.

Topics Include:

- State of the industry with Dr. David Kohl
- The latest on cattle nutrition, corn silage and cover crops
- Strategies to improve employee management and leadership at the farm level
- Expert information on calf care, reproduction, cull cow markets, technology and automation and more

**February 3-5, 2022**

**Bavarian Inn and  
Conference Center**

**Frankenmuth, Michigan**

[View glrdc homepage here](#)



## Updates on the economy, agricultural industries and outlooks featured at the 2021 Ag Credit Conference

Agricultural supply chains have confronted many challenges during the last two years, and the diversity of Michigan agriculture has led to a uniquely high number of challenges due to COVID-19. In its first year back since the beginning of the pandemic, experts at the Michigan Ag Credit Conference will share their insights on the past few years and provide an economic outlook for Michigan's agricultural economy.

The Michigan Ag Credit Conference is scheduled for Oct. 26 from 8:30 a.m. to 3 p.m. at the Kellogg Hotel and Conference Center in East Lansing, Mich. Designed to connect agricultural lenders, agribusinesses, policymakers, faculty experts, and industry stakeholders, this conference provides networking and learning opportunities in support of Michigan's agricultural industry.

"For decades, this conference has brought together a unique mix of financial and academic leadership to explore important trends for Michigan agriculture," said Trey Malone, assistant professor in the Department of Agricultural, Food, and Resource Economics at MSU. "Agricultural supply chains are in a profoundly unique moment. Through the opportunity to develop networks between university faculty and experts in their respective fields, I've found the conversations at this conference to be reinventing for me, and often spurs future research topic ideas."

"MSU's College of Agriculture and Natural Resources and the AFRE department specifically have had a lot of changes recently and this conference is a wonderful opportunity for the industry to meet our new administration and faculty," said Scott Swinton, AFRE department chair. "I look forward to connecting with participants as the new department chair and talking about how we can support the industry."

Participants can attend in person or listen to session recordings after the conference. Registration is \$130 per person for either option. In-person participants will also receive access to the recordings after the conference.

By *Melissa McKendree*





# In Memoriam

## Dr. Lorraine Sordillo-Gandy

Lorraine Marie Sordillo-Gandy, age 61, of Dewitt, Michigan passed away on September 10, 2021. Lorraine was the Meadow Brook Farm Animal Chair and professor in the Department of Large Animal Clinical Sciences in the MSU College of Veterinary Medicine.

Lorraine was born November 5, 1959, in Winchester, Massachusetts, the daughter Howard and Jacquelyn Neill. She was raised in Malden, Massachusetts, and received her BS and MS degrees from University of Massachusetts-Amherst. She earned her PhD in bovine immunology from Louisiana State University in 1987. She worked as a research scientist in the immunology group at the Vaccine and Infectious Disease Organization in Saskatoon, Canada, from 1987-1992 before beginning her academic career at the Pennsylvania State University from 1992-2004.

In 2004, Lorraine was recruited to Michigan State University as the first person to hold the Meadow Brook Chair in Farm Animal Health and Well Being.

Lorraine's primary research was focused on developing solutions to reduce health disorders in dairy cattle by investigating the interactions between nutrient metabolism, oxidative stress, and immunology. Her studies helped veterinarians and animal scientists worldwide to understand mammary gland immune responses and their role on mastitis in dairy cows. Her research resulted in 5 U.S. patents aimed at improving dairy cattle health. Lorraine wrote more than 170 peer-reviewed articles in scientific journals in addition to numerous chapters in books, proceedings articles and monographs. She garnered more than \$14 million in funds to help support her program, from industry and various federal funding agencies. She was often asked to speak at national and international meetings relating to dairy cattle health. She served on many national committees and received several U.S. and international awards for her research on bovine immunology and mastitis control.

Beyond her research contributions, Lorraine was a wonderful mentor. She was the primary advisor to more than 30 graduate students during her career, in addition to serving on the advisory committees of many others. As she advanced in her career, she became a tireless advocate and mentor for young faculty members. It's no accident that numerous former students now serve in faculty roles at universities around the country, including at MSU.

Lorraine loved all animals, especially dogs. She was an avid golfer and fly fisherman (who tied her own flies). In recent years she took up painting and became an accomplished artist.

She is survived by her husband of 35 years, Jeff Gandy; daughter, Candice Gandy; mother, Jacquelyn Neill; sister, Janice Neill; brothers, John, Michael, and Jim (Joanne) Sordillo; numerous nieces, nephews, and extended family. She was preceded in death by her father, Howard Neill.

Lorraine will be sorely missed as a scientist, a colleague, and especially as a friend.



## INFRASTRUCTURE INVESTMENT FOR A NEW STATE-OF-THE-ART DAIRY RESEARCH AND TEACHING FACILITY

“The current dairy teaching and research facility was built over 60 years ago...it has served the Michigan dairy industry well. Many amazing MSU alumni have been trained or conducted research there...but it doesn't represent the dairy industry standards and constrains our ability to train industry ready graduates and conduct industry ready research.”

**Barry Bradford**, MSU Meadows Endowed Chair for Dairy Management in the Department of Animal Science



Over the last 60 years, the U.S. dairy industry has evolved to meet the demands of consumers, including significant strides in reducing its environmental footprint. However, today the industry faces major challenges and increasing scrutiny regarding its impact on the planet, animal welfare and land use that requires long-term scientific data collection.

There are great opportunities, however, for research breakthroughs to improve the utilization of resources for milk production and to ultimately improve human health and nutrition.

MSU is a long-time leader in dairy cattle research, education and outreach, including the areas of nutrition, health, genetics and reproduction. We remain competitive, at the moment, in funding from USDA National Institute of Food and Agriculture, Foundation for Food and Agriculture Research, numerous industry organizations and others.

While having the faculty and knowledge base to tackle the complex challenges that face the dairy industry, MSU lacks the infrastructural capacity to deliver on the future needs of the industry, as well as to meet our mission.

**#1** farm gate value in Michigan

**25%** Michigan farm gate receipts

**50+** faculty and staff



Michigan has one of the **most productive and efficient** dairy industries:

**#1** in milk production per cow in the U.S.

**42%** increase in number of cows in MI compared to 2% increase in the U.S. over the past 20 years

**109%** increase in milk output in MI compared to 34% increase in the U.S. over the past 20 years



As temperatures rise, **Michigan will be ideal for dairy cow productivity and health** compared to other states, especially those in the south.

**Access to water** in Michigan is higher than most other dairy states.





The current MSU Dairy Cattle Teaching & Research Center is used by faculty to uncover novel approaches to improve the sustainability of the dairy sector to meet pressing needs created by changing climate, and to train students and professionals for this ever-changing industry.

That land-grant mission, however, is challenged by outdated infrastructure and equipment.

**A new facility is needed to ensure we can focus on:**

#### ✓ **Environmental sustainability**

MSU is a world renowned institution for discovering nutritional strategies for optimal productivity, and is among the very few universities with a commercial-scale methane digester at our dairy facility. However, critical questions about approaches to reducing climate changing emissions from dairy production cannot be answered with the current facilities. We have the potential to integrate animal, manure and field crop management systems for comprehensive investigations into reducing emissions associated with dairy production while promoting economic sustainability. These efforts are critical for addressing climate change and safeguarding our waterways.

#### ✓ **Precision management**

Individual animal management provides opportunities to improve animal welfare and production efficiency by addressing nuanced differences between each animal. A new facility will ensure that state-of-the-art precision livestock systems are available for research, teaching and outreach.

Students training to begin their careers in animal agriculture will step into roles where use of technology and data is required from the start. We must provide exposure to these tools—particularly for those unfamiliar with farm operations.

#### ✓ **Animal behavior and well-being**

MSU has an exemplary and long-standing animal behavior and welfare group. Our dairy experts, however, have had little opportunity to investigate best practices because our facility does not include commercial-style housing. A new facility is essential to ensuring MSU can address social sustainability of the dairy industry.



#### ✓ **Veterinary research**

Animal health is another MSU strength and is critical to a sustainable dairy industry. However many interventions cannot feasibly be tested in a small herd. A new facility equipped to house more animals will enable that strength to continue, with focus on veterinary care, genetics, nutrition and well being. New facilities with enhanced animal monitoring capabilities will enable research on antibiotic stewardship and sustainable livestock production.

#### ✓ **Broader inclusion within industry**

Surveys of dairy producers consistently show that labor is among the top concerns for farms. Unfortunately, very few avenues exist to introduce young people to the workings of dairy farms. The industry needs to be creative in attracting new talent. A new facility, designed from the ground-up to be safe and effective for educating young people to work on a dairy farm, will make significant impacts on broadening the base of dairy professionals.

#### **A new facility for the oldest land-grant**

More than 160 years ago, Michigan State University pioneered a bold experiment that revolutionized higher education—the **first land grant institution with a mission to discover, teach and serve**. That bold experiment will continue with a new dairy facility to meet the needs of the next generation.

To learn more about the current MSU Dairy Cattle Teaching and Research Center visit:

[canr.msu.edu/scaf/dairy\\_teaching\\_research\\_center](http://canr.msu.edu/scaf/dairy_teaching_research_center)



**MICHIGAN STATE**  
UNIVERSITY

Welcome  
CVM Students  
BUILDING ENTRANCE

# Welcome Back!

It feels good to be home. Fall 2021 has been a special time of reunion in the halls of the MSU College of Veterinary Medicine, with many returning to campus for the first time since spring 2020. Here are some snapshots of the first week back in business for the new school year.



Students enjoy dessert with the College's dean, Dr. Birgit Puschner (center), at the Aug. 13 ice cream social. Community members mingled to meet new friends and colleagues, and greet ones who they had not seen in a while.



Regular ice cream socials are a big part of the College's culture, often featuring sweets from the MSU Dairy Store.



New school years are always kicked off with Club Resource Fairs, in which the College's more-than-30 student organizations recruit members, share opportunities, and welcome new students. This year was no exception.



Members of the DVM Class of 2025 strike their goofiest poses during New Student Orientation. The class comprises 115 future veterinarians. Among them, they speak 16 languages and hail from 22 different states and countries.



# Student Activities

Opportunities to build a dairy network on campus



**Joe Domecq**  
domecqjo@msu.edu  
Dairy Education Coordinator  
Two and Four Year Programs



**DAIRY CATTLE  
TEACHING & RESEARCH**  
4075  
Michigan State University



This Farm is  
Environmentally  
Verified

Farmstead System  
Livestock System



## Dairy Club

- Connect with other students who are passionate about the dairy industry
- Help run student and industry events
- Develop leadership skills by serving on the executive board

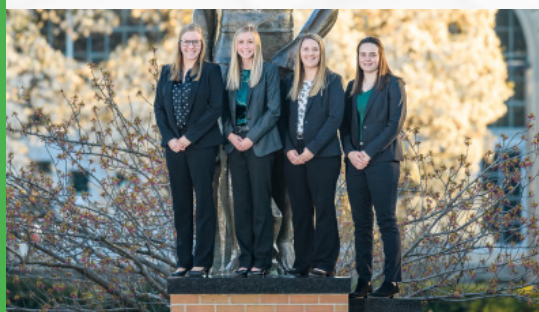
“Dairy Club is an opportunity for all students to grow a deeper appreciation and connection to the dairy industry, even if they have no immediate connection to a farm. We host events throughout the year that gives members a family-like atmosphere.” - Jessie Nash, 2021-22 President



## Dairy Judging

- Build communication and confidence skills
- Travel to many dairies and other states for contests
- Strong alumni group who continues to give back to the program's success

“I have developed so many skills because of dairy judging. Not to mention the number of people and memories I have made through this program!” - Kristen Burkhardt, 2021 team member



## Dairy Challenge

- Three-time national winners
- Network with dairy industry leaders
- Apply classroom knowledge to a real-world and practical experience working in a team setting

“The MSU Dairy Challenge program has provided me with the opportunity to gain valuable skills, experiences, and connections that have helped expand my knowledge of the dairy industry and grow as a person.” - Lynn Olthof, 2021 team member



## Dairy Industry Concentration

- Greater opportunity for hands-on, practical dairy experiences
- Coupled with courses providing broad scientific background
- More depth and breadth of knowledge for Ag Tech students who chose to further their education

“I'm looking forward to connecting with more students through this program and furthering my education within the dairy industry.”  
- Mikayla Bowen  
2020 Dairy Management  
Ag Tech graduate

# Management Tips

MSU Dairy Extension Team



Martin Mangual

## Parlor Performance Evaluations: A valuable tool for all farms

What occurs in the parlor determines in great part many aspects of your operation. Milk quality, quantity, key aspects of cow care and welfare, all are affected by the employees who work in the parlor. Developing a training program is key to ensure the success of the farm. However, do you know if you are using the correct protocols for milking? Do they provide what your cows need for care and maximum efficiency? These questions can easily be answered by doing a Parlor Performance Evaluation (PPE) in your parlor.

During a PPE, we do a thorough examination of parlor procedures. Extension educators use vacuum recording devices to analyze many individual milkings for markers such as claw vacuum at peak flow, time of over milking, time to peak flow (bimodal milking), and machine on time, among other metrics that can provide a lot of information regarding milking routines. Additional observations are also recorded in the parlor regarding pre-dip contact time, prep stimulation time, prep lag time and teat end mappings. Once completed, everything is organized in a summary report that can provide valuable information about how your parlor is operating or if your protocols are in line with current recommendations for optimal milk harvest.

Often, these reports reveal surprises that were holding the farm back. Research has shown that a high percentage of bimodal milking events can increase milk left in the udder thus affecting herd production and revenue.

*By Martin J. Mangual*

[Click here to view full article](#)



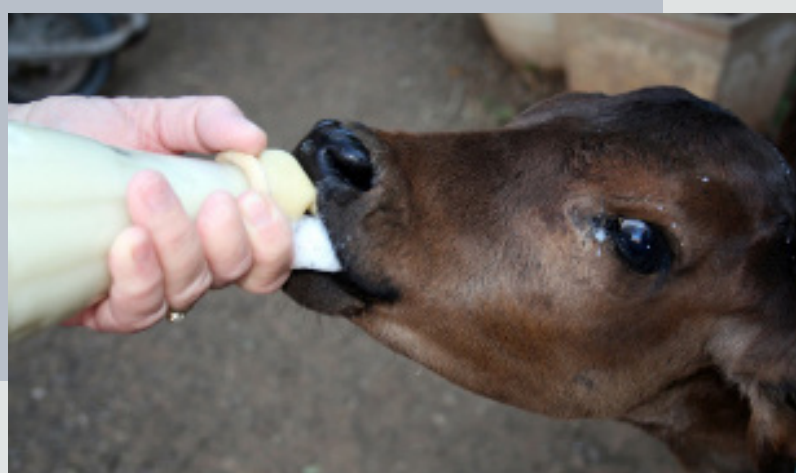
## Rumen development of calves

Cattle are ruminants, meaning their one stomach is comprised of four compartments: the rumen, reticulum, omasum, and abomasum. For mature cattle, the rumen makes up approximately 85% of the total capacity of the stomach complex, according to a Journal of Dairy Science article by Huber and others, and is the location where feed is fermented into usable energy components called volatile fatty acids.

Rumen development is largely measured by the development of the rumen papillae and rumen muscle mass. Rumen papillae are finger-like projections that protrude from the interior of the rumen wall to increase the surface area of the rumen for greater nutrient absorption. For the newborn calf, however, the rumen is underdeveloped and only accounts for approximately 35% of the total capacity of the stomach complex according to a Journal of Dairy Science article by Tamate and others. In newborn calves, the abomasum is the largest part of the stomach complex at 65%. Therefore, the rumen of a newborn calf must undergo significant developmental changes to store and digest feed in a manner similar to that of mature cattle.

When the calf suckles milk from the teat or bottle, the esophageal groove shuttles milk past the rumen and into the abomasum, where it will begin digestion. The abomasum and small intestine secrete enzymes that are designed to digest protein, fat, and carbohydrates that can be absorbed in the small intestine.

*By Jerad Jaborek*



[Click here to view full article](#)



# Management Tips

MSU Dairy Extension Team



Kevin Gould

Kim Cassida

## Forage alternatives for livestock in drought years

As livestock producers harvest and store forage resources for 2021-22, we may see significant risk with drought conditions reducing yields. This combined with elevated grain prices may create the perfect storm for significantly higher feed costs for livestock producers across large portions of the country.

This article is designed to help livestock producers better understand the potential problems ahead and offer some feasible solutions to help stretch limited forage supplies and budgets. For producers that rely heavily on hay or haylage for winter feed, Michigan State University Extension offers some alternatives that can help stretch limited forage supplies.

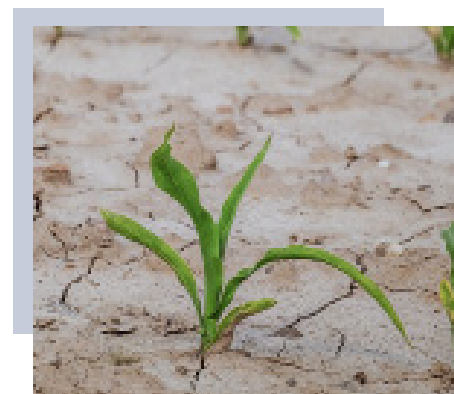
### Extend the Grazing Season

It is difficult to understate the impact that managed grazing can have on the length of the grazing season. Managing animal movement so that plants have a chance to recover from grazing is always important but never more so than when weather is not cooperating. Harvesting forage with livestock is also less costly than harvesting it with machines.

### Alternative Forages

Perennial forages are the backbone of many livestock operations but many perennials go dormant as a survival strategy during drought. Annual forages offer a solid alternative in drought emergencies because many can produce harvestable forage within eight weeks after planting given a minimal amount of water.

*By Kevin Gould and Kim Cassida*



[Click here to view full article](#)

## Dairy farm labor efficiency

Efficiency is defined in the Merriam-Webster Dictionary as: “the ability to do something or produce something without wasting materials, time, or energy.” Labor efficiency is not defined by one clear indicator rather it is important to measure it in various ways. Michigan State University Extension helps farmers not only evaluate their efficiency, but also provides guidance to improve it.

Dairy farming is a labor-intensive enterprise. Cows are brought up to the parlor in groups and milked two or three times daily. Beds are cleaned during this time, alleys scraped, and fresh feed delivered. As cows exit the parlor, some may be separated out for breeding or examination. Meanwhile, milk is prepared for calves to be fed and someone is involved in caring for them. In the maternity area, someone is watching over those due to calve. During cropping season, work and often workers are added to accomplish timely planting, care, harvesting, and storage of crops. There are many moving parts, many people doing important jobs, and many opportunities to assess labor priorities.

Labor efficiency on dairy farms is a critical measure that impacts cost of production as well as the farm’s work environment. Surveys from the U.S. Department of Agriculture (USDA) have identified economies of scale and lower unit costs as herd size increases. In general, larger farms often use larger equipment, reducing the field work hours and increasing the output per person. Feeding a longer line of cows doesn’t require an additional person, delivery tractors, or mixer.

MSU Extension Educator Stan Moore and I have been examining labor efficiency on dairy farms to help farmers understand how they compare to others and identify practices that lead to improvement.

*By Phil Durst*



[Click here to view full article](#)

# Management Tips

MSU Dairy Extension Team



Jerad Jaborek

## Why are my cattle bloating?

Bloat is a digestive disorder that results from the accumulation of excessive gas within the rumen and can lead to death of the animal by asphyxiation. Gases such as carbon dioxide and methane are normal by-products produced during microbial fermentation of feed stuffs. The gases produced in the rumen can either be absorbed through the rumen wall, travel through reticulum and the remaining digestive tract, or predominately, they are eructated or belched out through the esophagus. Eructation of gas from the rumen through the esophagus is done by a series of muscular contractions that is initiated by the accumulation of gas within the rumen to signal for its release. However, proper rumen function and motility can be impaired by large amounts of acids produced during ruminal fermentation. If normal rumen contractions are prevented or if the esophagus is obstructed, bloat can occur.

Acidosis and bloat can be interrelated, with acidosis predisposing animals to bloat. Using management practices that consider the proper amount of grain and roughage in the diet, proper grain selection and processing, use of proper bunk management, use of feed additives, and allowing adequate time between diet transitions can help to limit the occurrence of acidotic bouts in feedlot cattle. Furthermore, proper forage species selection and grazing management practices will help to prevent pasture bloat in grazing cattle.

*By Jerad Jaborek*



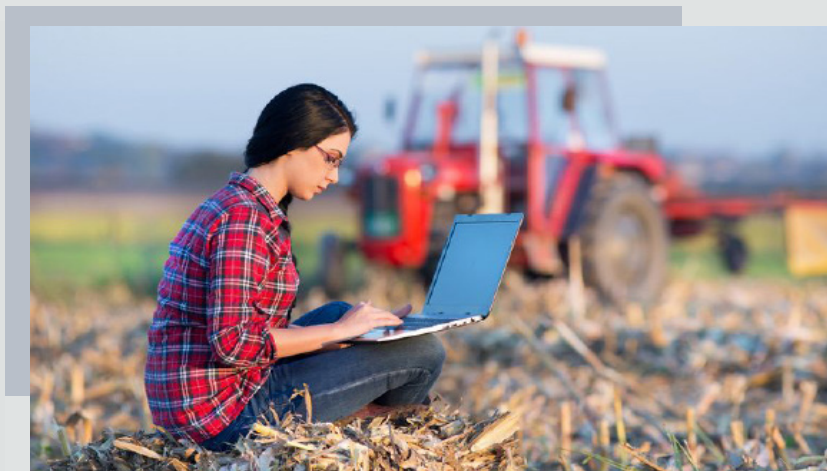
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## Beginning farmers, we've got news for you!

Beginning a career in agriculture is exciting and challenging. Michigan State University Extension has recently launched a monthly news digest, carefully curated by MSU Extension Educators to feature articles, resources, and events of interest to beginning farmers of all kinds. No matter what products a farmer grows or raises, this newsletter will feature content specifically aimed at those who are in the first 10 years of their farming career, or the first 10 years of diversifying to a new commodity, enterprise or growing practice. To sign up for the newsletter, visit the Michigan State University Extension: Mailing List Signup.

Beginning farmers ask important questions about how to get started with farming. Since 2012, many new farmers have found answers through the MSU Extension's Beginning Farmer Webinar Series. Building on the success of the webinar series, our new Beginning Farmer MSU Extension website provides a one-stop-shop featuring a variety of information that beginning farmers may find useful as they start, diversify and grow their business. The website serves as the home for educational and technical support for those seeking basic, startup information. Resources include access to videos, articles, and decision tools site spanning a range of agricultural enterprises including aquaculture, field crops, floriculture, fruit and nuts, livestock, organic, poultry, vegetables and other topics.

*By Mariel Borgman and Jon LaPorte*



[Click here to view full article](#)



# Management Tips

MSU Dairy Extension Team



Jon LaPorte

Eric Karbowski

## Financial health check-up...How healthy is your farm?

With rising market prices, increasing input costs, and volatile weather conditions, farm managers have had many reasons to feel enthusiastic and concerned about profitability for this year. As we reach the mid-point of the production season, now is a good time to start checking the pulse of your farm's financial health.

### Have you reviewed your farm budget or estimate for this year's cost of production?

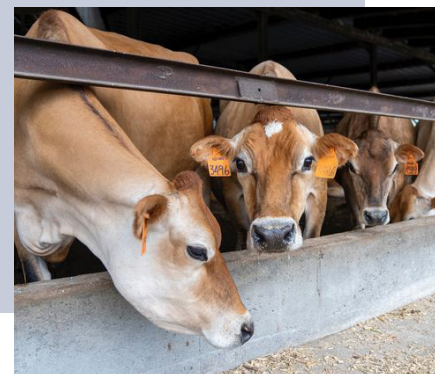
The rise of market prices often brings with it the increase in input costs needed for production. The 2021 season has been no exception to this trend. As reported by the Illinois University Farmdoc team, since the fall of 2020, fertilizer prices have increased significantly. Nitrogen products are up as high as 60%, phosphorus products are up 54%, and potash products are up 31%. To read the full report, visit the Farmdoc article on Fertilizer Price Increases for 2021 Production.

If your farm has experienced the impact of these higher costs, how does this affect your projected budget? Do the break-even prices you estimated still apply? Have break-evens increased? Remember, the farm budget isn't just something you put together for your lender. Knowing your budget is especially important in uncertain times and revisiting your financial plan can set you up for success for the rest of the year. For more information on developing your farm's cost of production, there are resources available from the MSU Extension farm business team:

- MSU Extension farm business team website - Budgets & Cost of Production page
- MSU Extension Bulletin E-3411 – Introduction to Cost of Production and Its Uses
- Video Presentation: Farm Budgets: Planning Now For Profits

*By Jon LaPorte and Eric Karbowski*

[Click here to view full article](#)



## Livestock Budget Estimator - Dairy

The Livestock Budget Estimator tool for Dairy producers is designed to assist with budget planning for your beef operation. It is a Microsoft Excel based tool built around key areas that producers need to consider as they plan for and continually evaluate their production season. It combines in one place:

- Marketing Goals
- Milk Production Goals
- Break-Evens of:
  - \* Net Farm Income
  - \* Cash Flow

Also available within the tool are comparisons to other dairy farms based on financial data obtained from the FINBIN database. FINBIN is one of the largest and most accessible sources of farm financial and production benchmark information. Farm financial data was collected from Minnesota, Wisconsin, and Michigan. These farm financials provide an opportunity to determine similarities, areas of strength, and potential areas of improvement for your farm business.

*By Jon LaPorte*



[Click here to view full article](#)

# Research Drill Down

Tasia (Taxis) Kendrick, Paul Coussens, Paul Bartlett, and Kelly Sporer

## The FYI on BLV: What you need to know to keep your herd healthy

If dairying were as easy as milking a cow and collecting income on the milk, everyone would be doing it. Right? The reality is that dairy farmers have an extensive list of tasks – among them are efforts to protect animal health and welfare. Producers may have a refrigerator full of vaccines and medicines to deal with a host of diseases that can affect the health, welfare, and productivity of their cows. But what if they are treating one ailment because a different, undetected virus is impairing the animal's immune system.

**You will not find a vaccine or medicine labeled to treat Bovine Leukemia Virus (BLV), but in some cases, it is the hidden culprit.**

If the farm doesn't test for BLV, the virus and any resulting illness or death will remain hidden as unassigned health problems. We've consistently heard from producers about how some animals do great on the farm – until they don't. These animals produce milk and may have repeated treatments for poor health, but nothing that stands out in management systems. Then one day, the animal stops – stops lactating, maintaining health, or even living. These animals are found to be BLV-positive animals, finally succumbing to the effects of the virus. Let's dive further into this virus and how it can be managed.

***Enzootic Bovine Leukosis is a contagious disease in cattle caused by BLV***

Today, 21 countries have eradicated the disease by testing and removing animals that showed an immune response to the virus. The United States and Canada ignored eradication measures in the 1970's when overall infection rates were below 10%. Today,

most United States dairy farms have BLV with upwards of 50% of cattle on each farm testing positive for BLV. There is currently no cure or vaccine available, and infected cattle will carry the virus for life. While animals infected with BLV may not show any indications of carrying the disease, other profit-related issues may arise.

**Cows infected with BLV suffer from the following consequences:**

***Decreased milk production.*** We see that first lactation milking heifers typically produce the same amount of milk regardless of infection. However, as the BLV-infected cow ages, she exhibits lower milk production than her non-infected herd mates. In general, a higher BLV herd prevalence is associated with a lower rolling herd average, and infected cows have a lower predicted 305-day mature equivalent milk yield. Also, genetically superior animals infected with BLV under-perform their estimated genetic potential.

***Decreased lifetime within the herd.*** BLV-infected cows are likely to be removed from the herd earlier than their uninfected herd mates (i.e., have a lower herd longevity). As such, BLV-infected cows often have a lower economic return due to a shortened productive life. Moreover, consumer perception of animal welfare issues may be raised around BLV prevalence on United States dairy farms.

***Decrease reproductive success.*** Cows infected with BLV need to be bred more times to obtain a pregnancy and have longer calving intervals. In rare cases, BLV-infected cows may develop tumors in the uterus resulting in the inability to become pregnant.

***Risk of slaughter condemnation.*** Tumor development may occur in animals with high levels of virus. These tumors are the main reason for carcass condemnation at slaughter by USDA inspectors.

***Negative economic impacts.*** It is challenging to estimate the true economic impact of BLV, given the multitude of underlying and confounding factors. In 2017, our team estimated an annual loss of approximately \$283 per milking cow, resulting in a \$2.7 billion national deficit due to BLV.





### **Bovine Leukemia Virus: A Hidden but Damaging Infection**

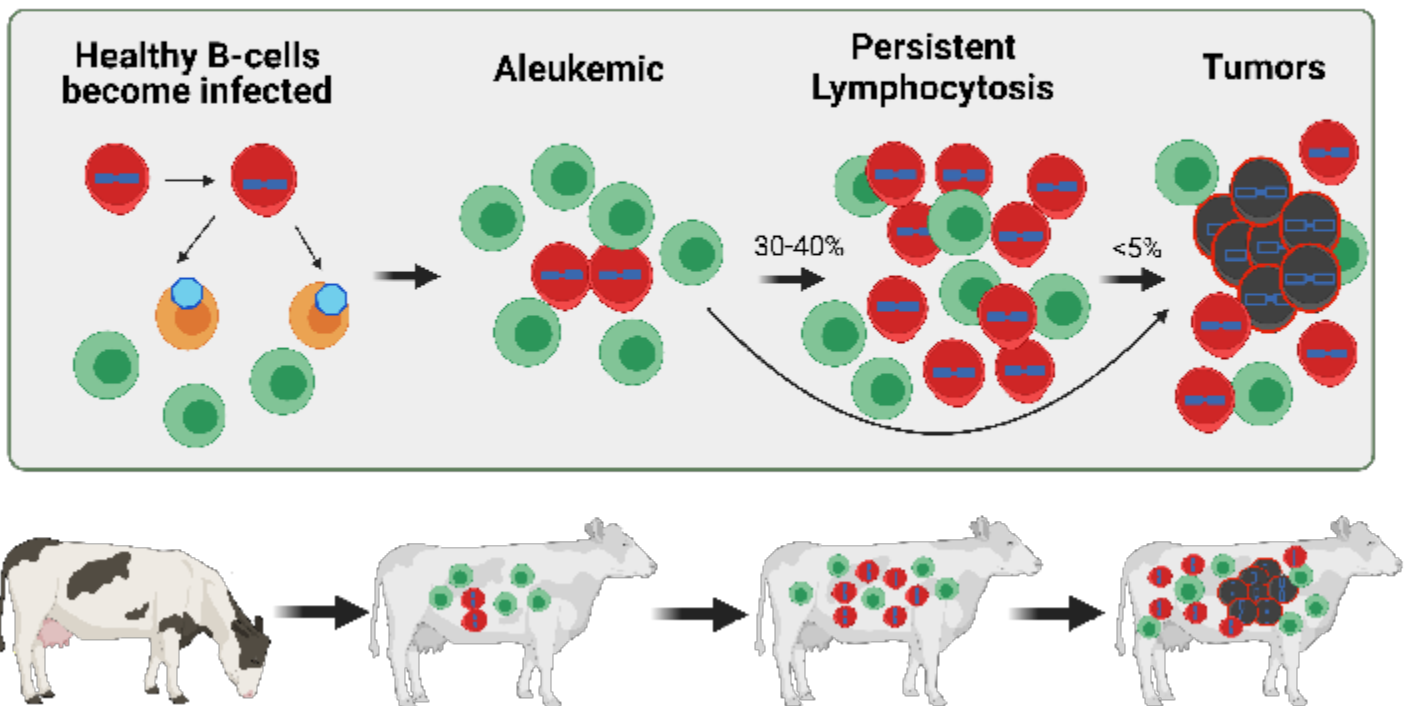
BLV is a virus that integrates into cattle DNA. The virus favors integration into a type of lymphocyte, the B-cell. These immune cells are best known for their ability to produce antibodies against pathogens. By integrating - or hiding - within the cattle's own cells, BLV can remain undetected by the animal's immune system leading to a persistent, life-long infection.

Within a few weeks after initial infection, the animal typically maintains a normal number of lymphocytes but antibodies to the virus can already be detected. Antibodies to BLV indicate that the animal's immune system has identified BLV as a stowaway and has started to create mechanisms to recognize and potentially fight the hidden invader. At this point, however, the virus remains hidden, or latent, without doing much damage. Most cattle infected with BLV can

be found in this stage of bovine leukosis and lack any sign of illness. These cattle simply act as carriers of the virus.

After a period of hiding, ranging from months to years, BLV begins replicate. Approximately one-third of cattle infected with BLV will exhibit an increased number of blood lymphocytes due to abnormal replication of BLV-infected cells. This phase of BLV replication leads to a decrease in immune system function – allowing other pathogens or infections to develop. An ongoing study has collected samples from groups of cattle across multiple Michigan dairy farms, and we have found that animals with BLV suffer an impaired response to vaccines. These cattle may become ill due to a wide variety of ailments or suffer health issues, such as lameness and mastitis, due to immune system dysregulation caused by BLV.

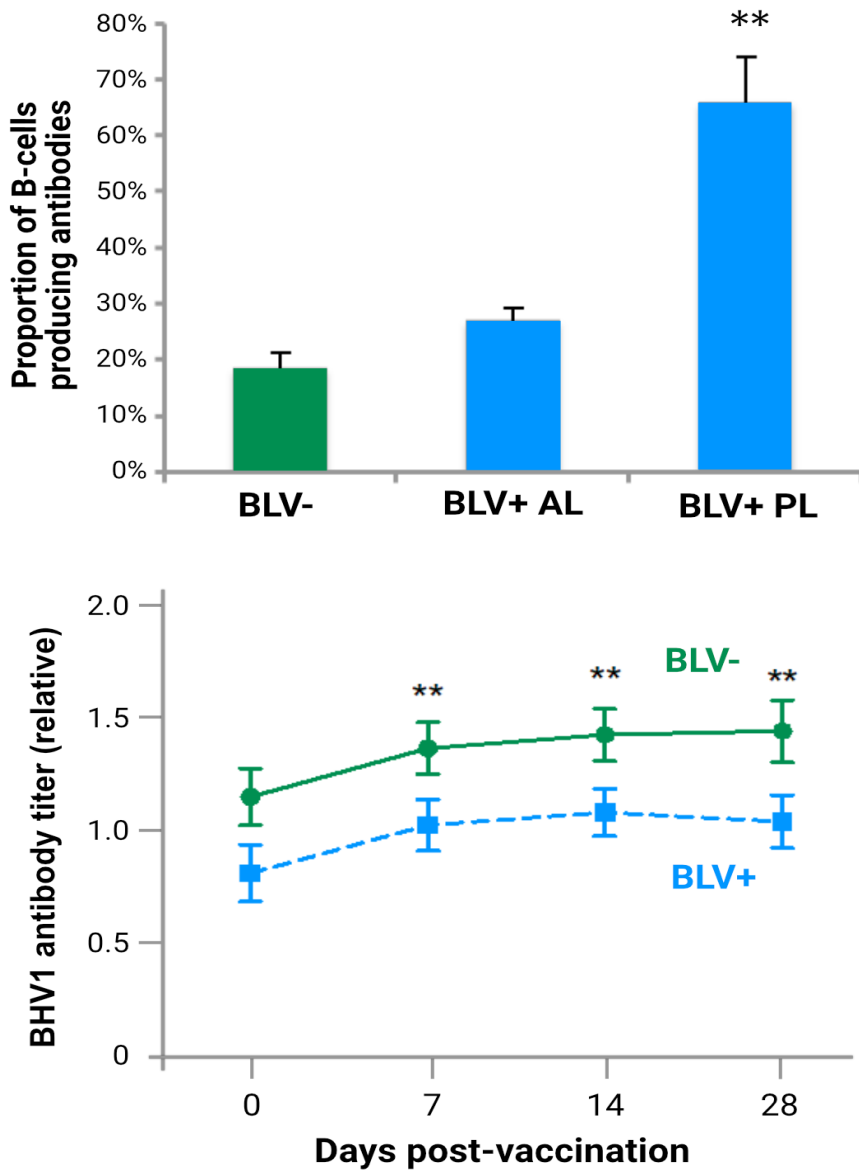
## **BLV Disease Progression**



**FIGURE 1: Stages of BLV Disease Progression**

After BLV infection, the virus incorporates itself into the animals' DNA within lymphocyte cells. There the virus can remain silent or "latent" within the cell, undetected by the animal's immune system. However, 30% - 40% of BLV-infected animals will experience lymphocyte cell growth due to BLV influencing cell replication. Cell growth may cause a depressed immune system within the animal. Only a few (<5%) of the animals infected with BLV will display tumor growth due to a mutation in the infected cells, causing them to replicate and form a solid mass. Cattle with a tumor due to bovine leukosis will suffer early death and condemnation at slaughter.

*Image modified from EFSA Panel Animal Health and Welfare (AHAW): Enzootic bovine leukosis (2015).*



**Figure 2. BLV-infected B-cells are active but have reduced ability to release pathogen-targeting antibodies.**

B-cells are part of the immune system, producing antibodies against pathogens, such as BLV. The top graph shows antibody producing B-cells in animals uninfected, or BLV negative (green bar) and BLV-infected (blue bars) cows. The two blue bars indicate BLV-infected cows at two different stages of bovine leukosis: aleukemic (BLV+ AL) and persistent lymphocytotic (BLV+ PL) cows. Aleukemic (BLV+ AL) cows have lymphocyte counts near healthy (BLV-) cows while persistent lymphocytotic (BLV+ PL) cows have elevated lymphocyte numbers.

Vaccines and boosters provide the animal with the ability to create antibodies to fight against the pathogen. The bottom graph shows 28-day bovine herpesvirus 1 (BHV1) antibody titer levels between BLV-infected and uninfected cows. Cows were given a normal booster dose of a commercial multi-valent vaccine on day 0. The level of antibodies against BHV1 were monitored each week for 3 weeks. Antibodies against BHV1 were lower in BLV-infected cows. Two other antibody levels were tested (*Leptospira hardjo* and *Leptospira Pomona*) and showed similar results. These results demonstrate a decrease in vaccine efficiency within BLV-infected cattle.

*Lower panel modified from Frie et al., Vet. Immunol. Immunopathol., 2016.*



Less than 5% of BLV-infected cattle will develop dramatically elevated lymphocyte numbers, tumors (lymphosarcoma), and death due to BLV infections. Animals suffering terminal stages of bovine leukosis are characterized by loss of body condition and overall weakness preceding death. Tumors associated with BLV infection are one of the leading causes of carcass condemnations in United States dairy cattle. Regardless of stage of disease, animal welfare continues to be of concern, as do associated effects on cattle health and productivity.

The disease progresses differently in each animal. Sometimes the disease generates tumors and leads to death, while other cattle simply harbor the virus, showing no direct signs of illness – all the while spreading the virus to their herd mates.



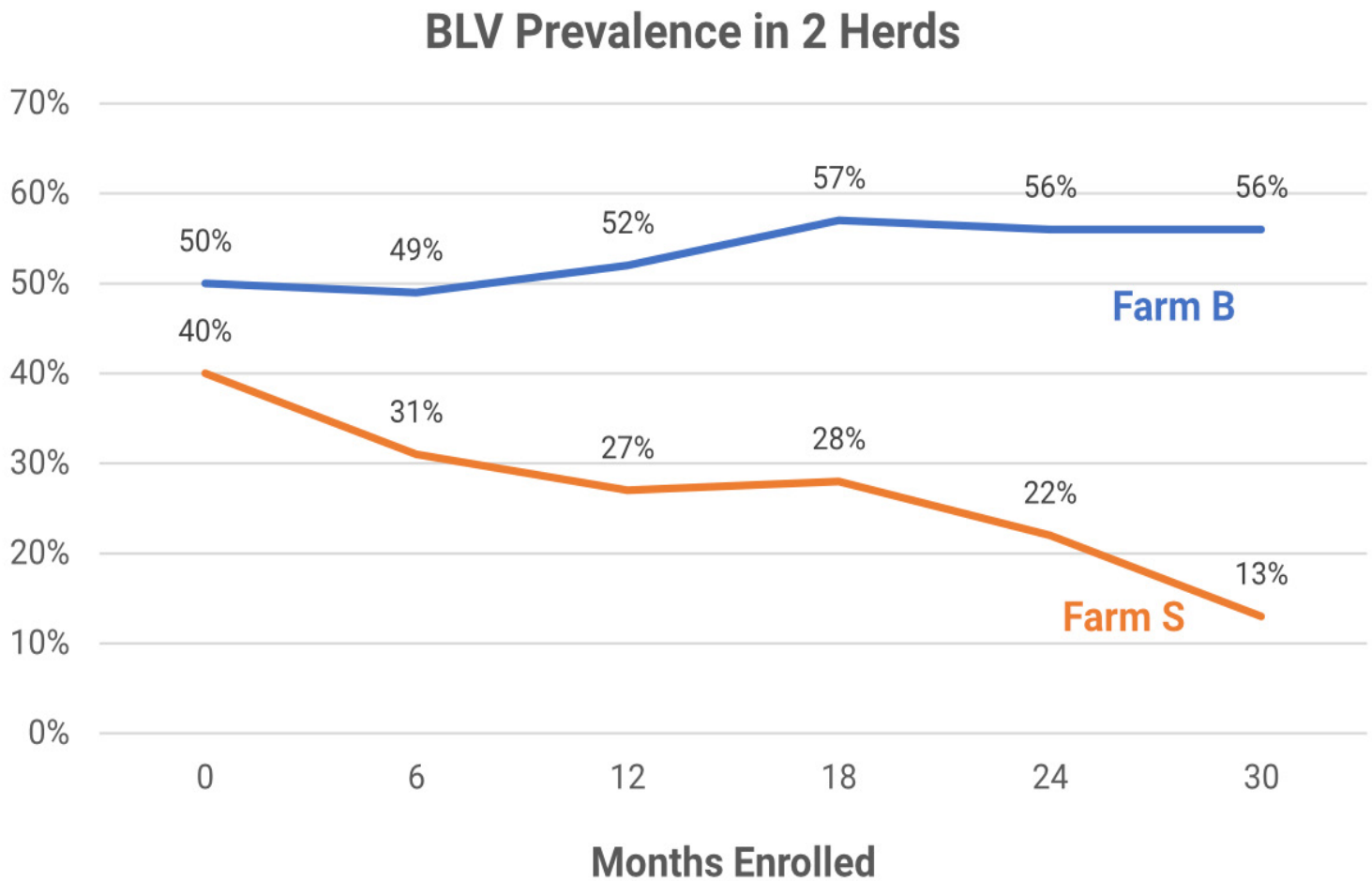
## Tools and Management Strategies to Reduce BLV

MSU scientists and their collaborators continue to work with producers across the country to study bovine leukosis, viral progression, and management strategies for a healthier, more productive herd.

Our team has established management tools and protocols to identify the most infectious cattle for removal, even when removal of all infected animals is not economically viable. Once BLV prevalence falls to a low level, the farm may then opt to remove all infected cattle to “Move to Zero” and become a BLV-free herd. Management strategies should also include prevention of new infections through proper calf care, testing of purchased replacements, and potentially segregation of infected animals.

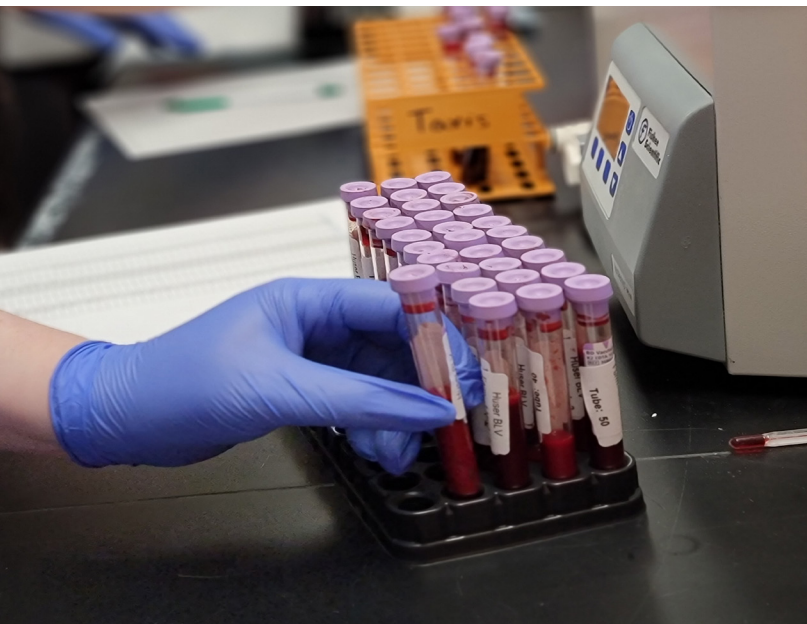
## Preventing Transmission

The most recognized route of BLV infection is transmission of infected lymphocytes (via blood) from one animal to another. While the tiniest drop of blood can be sufficient to cause infection, it's more likely that repeated blood-to-blood exposures ultimately lead to BLV transmission between animals. Small amounts of blood can be transferred when using the same equipment between animals for injections, rectal palpations, foot trims, ear tagging, tattooing, dehorning, and other procedures. Single-use needles and reproductive exam sleeves are often recommended, and the use of fly control has also been shown to reduce BLV infections.



**Figure 3. BLV infection rates in herds with different disease management strategies.**

Farm B uses needles only once but reuses palpation sleeves, struggles with fly control, and was not able to prioritize BLV control in the face of other management challenges. Super shedders (the most infectious cows) in the herd were not culled. Farm S uses needles and palpation sleeves once, pasteurizes colostrum and calf milk, prioritizes fly control, uses BLV status in herd management software to make breeding and culling decisions, and has aggressively culled super shedders. These examples show the impact of recommended practices on BLV infection rates in just 2 ½ years of effort.



Calves can become infected by consuming BLV-infected colostrum. Freezing or pasteurizing colostrum will kill the virus, preventing BLV replication. Therefore, using processed colostrum or milk replacer will reduce the risk of transmission. Colostrum collected from BLV-infected dams contains maternal BLV antibodies, and studies have indicated that calves fed colostrum with maternal BLV antibodies may be protected from advanced stages of bovine leukosis. Research to investigate the best calf feeding regimen for animal longevity and health is an important ongoing effort.

Bovine leukemia virus has been found in nasal secretions and saliva, but at a much lower concentration than that found in the blood of an infected animal. A low risk of BLV transmission may occur with nose-to-nose contact, natural mating, or dam-to-fetus transfer in utero.

### Management Strategies

Our research team, in collaboration with CentralStar Cooperative, has developed a multi-step approach to reduce herd BLV prevalence. The first step determines the herd's overall BLV prevalence by testing for BLV antibodies (by ELISA). Typically, this testing is performed on the milking herd through DHI, with owner-submitted milk samples, or in serum from submitted blood samples. In most cases, the BLV ELISA prevalence is high enough that culling all BLV-antibody-positive cattle would be economically infeasible. The second step of the screening process includes collecting a whole blood sample from BLV-antibody-positive cattle and measuring the concentration of BLV (proviral load). This identifies the "super shedders," or the most infectious cows that should be separated and removed from the herd as soon as possible. Success of

these programs relies on how aggressive the farm can afford to be in removing BLV-positive animals, while preventing incoming infections from replacements.

### Genetic Selection

Like humans and other animals, the immune system of cattle can respond to a wide range of pathogens. The genes important for proper immune function are directly inherited from the sire and dam. Not surprisingly, genetics play a role in an animal's response to BLV infection. One important and diverse DNA region is known as the bovine leukocyte antigen (BoLA) gene. Research suggests that some versions of the gene are associated with BLV resistance, defined as maintaining a low amount of virus even after prolonged BLV infection. Conversely, other versions of this gene may increase susceptibility to BLV infection. One avenue of research is examining a potential link between BoLA and the possibility of the removal of infected cells by other parts of the immune system. As research to determine genetic associations related to BLV resistance advances, selection of breeding stock to aid in lowering BLV prevalence within a herd may be possible.



*Madison Sokacz drawing a blood sample*





Ciarra LaHuis with calf

### ***The Future of BLV Research at MSU***

The MSU BLV Research team continues to collaborate with external researchers to enhance our understanding of the biological and economic impacts of BLV. We hold an annual “All Things BLV Meeting” for the researchers and interested producers, and we host an interactive website that serves as a portal for BLV information ([canr.msu.edu/blv](http://canr.msu.edu/blv)). We strive to collaborate with and learn from producers, providing tools and management strategies for improved profitability and healthier animals. A subset of collaborating farms have followed our proposed management programs and are nearing a BLV-free herd status. Over the next year, we hope to provide a low-cost monitoring test for BLV-free herds to validate and maintain their BLV-free status. Additionally, we hope to organize new recognition platforms for BLV-free farms to allow them to showcase their hard work.

Our laboratories and research projects also provide opportunities for undergraduate and graduate students to receive mentoring, carry out research, and gain experience within the dairy industry. Over the next few years, we hope our work can answer some of the following questions:

### **When does BLV transmission commonly happen and how is the animal’s lifespan affected?**

We have found that dairy cows typically exhibit an increase in lymphocyte cells due to BLV replication at the start of their second lactation. However, we believe cows are becoming exposed and infected with the virus well before the second lactation. We started a 5-year USDA-funded project in Spring 2021 and are sampling calves at birth, before breeding, 60 days pregnant, and at entry into the milking herd to determine when the animal first becomes exposed to the virus. By tracking the animal over 3-4 lactations, we will also be able to determine if the time of infection affects the animal’s longevity within the herd.

### **What’s to be gained from reducing BLV herd prevalence?**

A study on Michigan dairy herds indicated that BLV-positive cows are 23% more likely to die or be culled than their BLV-negative herd mates over a 19-month period. Additionally, cattle with BLV are known to succumb to other diseases or infections which require treatment. Treatments or unexpected deaths provide an economic strain on the farmer. Beginning this Fall, we will be incorporating producer financial data (TelFarm) and animal data from commercial farms for an updated, inclusive economic assessment of BLV. Our project will create interactive producer tools and economic assessments focused on the impact of BLV and the economic effectiveness of BLV management programs.

### **What are the triggers that cause BLV to come out of hiding and begin replicating in an animal?**

The ability of BLV to make copies of itself is largely controlled by many of the same proteins that control the normal growth of B-cells responding to a vaccine. We have evidence that stimulation of the immune system (e.g., vaccination) may cause BLV to begin replicating



and increase proviral load. Although temporary, this increase may make such animals more infectious for a period of time. If these observations are validated, the results might lead to management strategies to control BLV transmission following periods of vaccine administration.

### What about BLV in beef herds?

Bovine leukemia virus also infects beef cattle, but much less is known about its impact. Survey projects have found that BLV-infected beef cattle are at an 18% greater culling risk than uninfected herd mates. Within Michigan, 26% of breeding beef bulls between 1-10 years old were infected with BLV. In 2017, 34% of the beef cattle in the United States slaughterhouses tested positive for BLV, a 20% increase in 20 years.

While transmission of BLV via semen is usually considered unlikely, there are major international trade restrictions on semen from BLV-infected bulls. Collaborative projects have been initiated to explore BLV prevalence and disease progression in United States beef cattle and genetic factors contributing to advanced stages of BLV-induced disease. Working with beef producers, we can adapt management strategies that produced positive outcomes in dairy herds.

**The MSU BLV Research Team** includes experts with wide-ranging expertise in genetics, epidemiology, veterinary medicine, economics, and outreach, all of whom are proud to work with dairy and beef farmers. We pride ourselves on listening during producer conversations, to enable us to conduct practical research that will promote the success of the farm and health of the animals. We are grateful for the producers who have collaborated with our research team and look forward to continued growth in these collaborations.

Consumers continue to focus on individual animal health and welfare issues linked to products they purchase. The industry needs to act proactively to be ready to address consumer concerns. Starting the discussion of herd BLV prevalence, utilizing our economic estimation tool to understand the benefits of BLV management, and learning from other producers' experiences provide the foundation to addressing BLV. We encourage anyone to reach out to a BLV team member to share ideas, seek advice, or look for more information.

For more information visit: [canr.msu.edu/blv](http://canr.msu.edu/blv)



## Meet the Authors



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Diagnostic Technical Specialist

CentralStar Cooperative



# Michigan Dairy Recognition

Shining a light on industry leaders



## 2021 MMPA Outstanding Young Dairy Cooperators

Kip and Rochelle Siegler of Imlay City, Michigan, were selected as the 2021 Michigan Milk Producers Association Outstanding Young Dairy Cooperators (OYDC) by a panel of leaders in the Great Lakes dairy industry. Nolan Weiber of Pompeii, Michigan, was selected as the runner-up young cooperator.

The Sieglers farm around 1,900 acres and operate a 200-cow dairy with Kip's family. They are members of the MMPA Mid-Thumb Local in District 8. The couple also runs a successful YouTube channel, Kip Siegler Dairy Farming, with over 25,000 subscribers and 3 million total views.

[Click here to view full article](#)



## Recognizing Hank Choate

2016 MSU Department of Animal Science Dairy Farmer of the Year Hank Choate sold his cows in August 2021. We would like to thank Hank for his service and commitment to the dairy industry over many years.

Hank's passion for the dairy industry did not go unnoticed. He has held several leadership positions at local and statewide levels, including the MMPA Board of Directors, UDIM Board of Directors, GreenStone Farm Credit Board, NorthStar Cooperative Advisory Committee, the Michigan Farm Bureau Dairy Committee and Breakfast on the Farm Statewide Council. Thank you for your service and commitment, Hank! The Michigan dairy industry is better because of you.



## Michigan Dairy Industry Conference Awards

At this year's Michigan Dairy Industry Conference, two individuals were awarded in recognition of their success and commitment to the dairy community. The Michigan Dairy Industry Service Award was awarded to Neil Bendixen, hauling manager for Dairy Farmers of America. Neil is active on the Dairy Practices Council, 3-A Committee, NCIMS's executive committee, and the Michigan Dairy Industry Board.

This year's recipient of the Fieldperson of the Year Award was Ben Chapin. He is currently the Manager of Field Services with Michigan Milk Producers Association. Ben is also very active in various leadership boards including NMC, DPC, MDIC, and NCIMS. A huge congratulations to these very deserving dairy industry members!

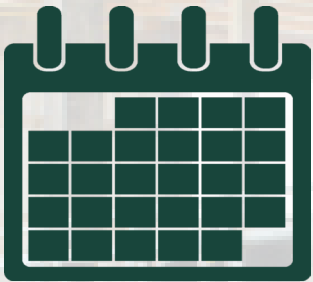
**Neil Bendixen**

**Ben Chapin**

**MICHIGAN STATE**  
**UNIVERSITY**

**Extension**

2265K Anthony Hall  
474 S. Shaw Lane  
East Lansing, MI 48824



## Mark your calendar

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- [Great Lakes Regional Dairy Conference](#)  
February 3-5, 2022
- [Michigan Dairy Health Symposium](#)  
March 10, 2022

Want to connect with your local dairy  
Extension educator? Find them [here](#):

