

# Spartan Dairy

## Newsletter

Winter 2021 Vol.1 No.1



### **Benthem Brothers Named 2021 MSU Dairy Farmer of the Year**

*L to R: Jason, Kyle, Ryan, and Bruce Benthem*

2021 MSU Dairy Farmer of the Year

pg. 2

Should we be feeding transition milk to dairy heifer calves?

pg. 9

Feed Saved - The next step in breeding a more efficient cow?

pg. 10

Kudos to these Michigan dairy industry leaders

pg. 14



# Table of Contents



## Dairy Farmer of the Year.....pg. 2

- Benthem Brothers

## Dairy Spotlight.....pg. 3

- Barry Bradford

## News and Updates.....pg. 4

- Animal science graduate student researches dairy nutrition
- AFRE senior learns the business side of the dairy industry
- Join the MSU Extension Dairy team on the Virtual Coffee Break podcast
- Who is substituting milk with plant-based beverages and why?
- MSU researchers receive grants to study dairy cattle health
- On-farm employee trainings available for Michigan dairy farms
- Check out the 2021 Dairy Program Booklet
- Learning the art and science of cheesemaking



## Management Tips.....pg. 7

- New skills your farm or food business will need to develop due to COVID-19
- The economic impact of duration of antibiotic treatment for mastitis
- A new online record keeping tool is available for conservation planning
- But they're family!
- Should we be feeding transition milk to dairy heifer calves?

## Research Drill Down.....pg. 10

- Feed Saved - The next step in breeding a more efficient cow?

## Michigan Dairy Recognition.....pg. 14

- Brent and Emily Simon
- Carla Wardin
- Brian Troyer



## How would you prefer to receive this newsletter?

printed and mailed

[tinyurl.com/q5fxfm1c](https://tinyurl.com/q5fxfm1c)



Email

[tinyurl.com/zg6nztxf](https://tinyurl.com/zg6nztxf)



# Dairy Farmer of the Year

Benthem Family

Benthem Brothers Dairy received the 2021 MSU Dairy Farmer of the Year Award. The dairy is a family operation run by brothers Doug and Bruce, along with Doug's son Jason and Bruce's sons Ryan and Kyle. The award is given by the Department of Animal Science at Michigan State University (MSU) and was presented during the Great Lakes Regional Dairy Conference, which was held virtually Feb. 4-5, 2021.

***Benthem Brothers Dairy, located in McBain, Michigan (Missaukee County), started with 30 cows in 1981, when Doug and Bruce took over the family farm started by their parents Edwin and Trina Benthem in the 1940s. Today, Doug and Bruce are in the process of transitioning the farm ownership and management to their sons, while providing leadership and counsel. Jason and the herdsman manage the cows and work with the employees. Ryan manages feed, purchasing and business aspects, while Kyle is taking on the role of crop production and serves as the lead for managing milk price risk. Jason is also the main contact for inspections conducted by regulatory agencies and dairy cooperative field staff.***

Character, unity and teamwork were evident, when representatives from the Department of Animal Science and MSU Extension visited the farm. "The family trusts one another and their employees and look to each other to make sure all aspects of the farm are managed and maintained", said Phil Durst, Extension Educator in northern Michigan.

The dairy has grown to around 2,850 cows. Expansion was accompanied by increases in acreage as opportunities arose, including purchase of the original Benthem homestead farm dating back to the 1880s, as well as infrastructure upgrades and additions. The history of the farm and its trajectory were featured in a virtual farm tour during the 2018 World Dairy Expo.



*Left to right: Bruce, Jason, Kyle, Doug*

"The Benthems are leading the way in using new technologies which benefit farm economics, employee satisfaction and animal welfare," said Dr. Dale Rozeboom, interim co-chair of the Department of Animal Science. "It is with great pleasure that the MSU Department of Animal Science recognizes the Benthem Brothers Dairy as the 2021 MSU Dairy Farmer of the Year."

[View full article here](#)

# Dairy Spotlight

Barry Bradford

I am proud and excited to share with you the inaugural issue of the Dairy at MSU Newsletter! I hope this platform will provide a means to help you stay in touch with MSU, the people of the Michigan dairy industry, and the latest research relevant to dairy production.

Allow me to take a moment to introduce myself, for those I haven't had a chance to meet yet. I am a native of Iowa who was raised on a purebred Angus operation and began to develop an interest in dairy during my time as an undergraduate at Iowa State University. I first had the opportunity to explore the great state of Michigan as I completed a PhD in dairy nutrition at MSU under Dr. Mike Allen's expert supervision in the mid-2000's. Still relatively new to the dairy industry at the time, I had no idea that I would return to MSU in 2020 in a dairy management position with 50% Extension responsibilities! The 13 years I spent on faculty at Kansas State University gave me time to develop my understanding of this industry and the many hats that dairy managers have to wear. I am extremely honored to take on a leadership role in helping MSU stay connected and relevant to the dairy industry.



My wife and I have settled with our three kids in DeWitt, which we are enjoying despite COVID limitations. Besides the strength of MSU's dairy programs and the excellent colleagues I get to work with here, the natural beauty of this state was a big draw for us to move back. In our first year here, we've gotten the family outfitted with kayaks, cross country skis, and more beach gear than was warranted in Kansas.

One of the key challenges facing Extension programs around the country is to find the niche where we can support agricultural enterprises in a world saturated with information. This is certainly a very different world than the rural America of 1914, when the Smith-Lever act created the Extension system. Still, as I have had the fortune to interact with dairy producers and advisors around the world, the university – industry connections mediated by Extension in the U.S. are the envy of nearly every country I've visited. I am convinced that the two-way exchange of information, without the influence of sales goals, remains as valuable today as it has ever been. However, to take full advantage of this model, we need to work toward more integrated, collaborative discovery efforts.

This newsletter is one step that we are taking to try to help cut through the clutter. We want to connect with you however you prefer – print mailings, podcasts, videos, social media – and yes, in person visits. I would love to hear from you about this newsletter and our collective efforts to engage, positive or negative. Let's find ways to help each other build an even stronger Michigan dairy industry.

**Barry Bradford**

Clint Meadows Chair in Dairy Management  
Department of Animal Science

# News & Updates

All things dairy at MSU

## Animal science graduate student researches dairy nutrition

Animal science graduate student Ariana Negreiro was one of the 2020 College of Agriculture and Natural Resources Alumni Association Scholarship awardees. Initially, Negreiro was interested in veterinary school at Michigan State University (MSU), but after working at the dairy farm on campus, she found her passion for dairy cows and research.

She started dairy nutrition research as an undergraduate student assistant for Dr. Adam Lockin the Department of Animal Science. As an undergraduate, Negreiro took first place for her research presentations in 2019 at the Tri-State Dairy Nutrition Conference, and in 2018 at the American Dairy Science Association Annual Meeting.

By Beth Bonsall



## AFRE senior learns the business side of the dairy industry

Agribusiness management senior Lynn Olthof says agriculture has always been close to her heart from a young age, starting with childhood experiences on her grandparents' dairy farm. By the age of five, Olthof had a Holstein calf on a halter following her around the farm.

"From as far back as I can remember, agriculture has been my passion," she said. "My grandparents' dairy farm was my introduction to agriculture, but it was only the beginning. I participated in 4-H and FFA, starting both as soon as I was able to, and had the opportunity to show dairy cattle at the county fair for more than a decade."



[View full article here](#)

[View full article here](#)

## Join the MSU Extension Dairy team on the Virtual Coffee Break podcast

Rolled out in spring 2020, this podcast series provides fresh content that can help you keep learning as you go about your day.

Season one featured a variety of guests that included farmers, researchers, and industry experts. Topics discussed included how to dairy promotion, methods to improve milk quality, LEAN management, antibiotic use, corn silage, and more. Season two featured 10 episodes covering animal health, feed management, calf management, and financial management.



Search for Virtual Coffee Break MSU Dairy Team on your favorite podcast app or visit <https://anchor.fm/msu-dairy-team>

Please join us by searching for the virtual coffee break with the MSU Extension Dairy team on your favorite podcast platform, including Spotify, Apple podcasts, Google podcasts, and more. The podcast can also be

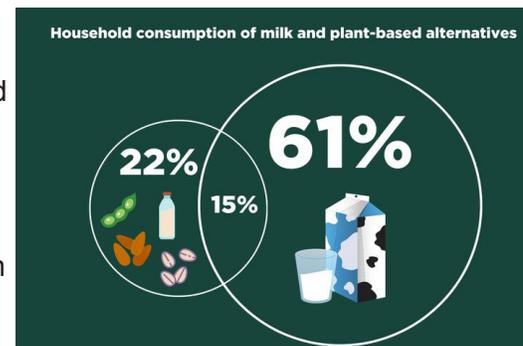
accessed at <https://anchor.fm/msu-dairy-team>.

## Who is substituting milk with plant-based beverages and why?

What is going on with dairy demand, and what is to blame? In a recent study published in the Journal of Dairy Science, we surveyed 995 U.S. households to understand whether Americans are consuming milk, plant-based alternative beverages or both.

While there is a long history of dairy milk as a food staple, fluid milk sales revenue in the United States decreased from nearly \$19 billion in 2013 to less than \$16 billion in 2018.

The downward trend has been attributed to declining milk consumption frequency rather than changing serving portions; Americans born in the 1990's consume milk less often than earlier generations. *By Trey Malone*



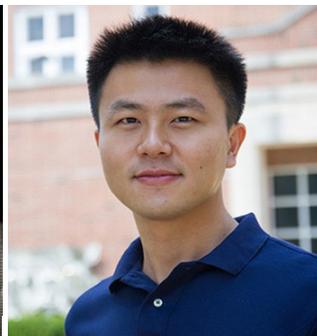
[View full article here](#)

# News & Updates

All things dairy at MSU

## MSU researchers receive grants to study dairy cattle health

Over the last 6 months, MSU faculty have landed nearly \$2 million in new research grants from the USDA to work on various aspects of dairy cattle health.



Tasia Kendrick, assistant professor in the Department of Animal Science (ANS), will further advance previous work by MSU's bovine leukemia virus (BLV) team to limit the spread of the disease.

Richard Pursley, professor in ANS, will study declining fertility rates of dairy cows after they have their first calf.

Zheng Zhou, assistant professor in ANS, will study whether functional nutrients can improve liver function in transition cows and prevent fatty liver disease.

Andres Contreras, associate professor in the Department of Large Animal Clinical Sciences, will collaborate with Adam Lock, professor in ANS, to study early lactation cows who experience excessive release of body fat and understand the role of inflammation in this process.

## On-farm employee trainings available for Michigan dairy farms

Employee development and education is one of the key components of successful farm management. Training is necessary so new employees learn how to perform their jobs, but re-training of more experienced employees also has benefits, such as preventing protocol drift. Additionally, providing training opportunities for employees can improve the work environment and reduce employee turnover.

The Dairy Team from Michigan State University Extension has multiple employee training programs available upon request for dairy farms in Michigan. The training sessions usually include a presentation followed by a hands-on demonstration, and all trainings can be taught in English and Spanish.

Below is the list of training programs currently offered by the MSUE Dairy Team. If you are looking for a training that is not on the list, please contact your closest Dairy Extension Educator or Paola Bacigalupo.

*By Paola Bacigalupo Sanguesa*

- **On-farm stockmanship and down cow movement**
- **Calf care**
- **Dehorning using a hot iron with pain mitigation**
- **Maternity training**
- **Feeder training**
- **Hands-on euthanasia training**

Find contact information for any of our Extension experts at:

[www.canr.msu.edu/dairy/experts](http://www.canr.msu.edu/dairy/experts)

[View full article here](#)

# News & Updates

All things dairy at MSU

## Check out the 2021 dairy program booklet

Many of us will look back on 2020 and be glad that it is gone. There was the onset of COVID, market disruptions, social disruptions and political disruptions. Certainly, the way Extension works with farmers and industry was greatly disrupted. It would be shortsighted, however, not to acknowledge the many things for which to be thankful, whether simple things such as health and strength, joys of family or ways that your business improved. Now we look ahead to 2021 with hope and optimism.

There is hope the pandemic will be greatly slowed by a new vaccine. There is hope markets will pick up and the food service sector will once again demand dairy products. There is hope people will be able to go out and to meet freely again. At this time however, COVID is still with us and unrestrained, and MSU Extension is still restricted in how we operate.

In 2021, Extension will still rely on mostly technological means (Zoom calls, video and audio recordings, phone, etc.) to reach farmers and ag professionals. We are able, with administrative permission, to make farm visits in response to requests by farmers regarding problems identified that need our in-person efforts. Please contact your Dairy Educator.

Though our ability to travel is less, our heartbeat for dairy farmers is no less strong. We want to be able to help, encourage and guide you and your employees. This booklet tells of many ways that we can do that. Thanks for your work to produce a high-quality food product!

[View full booklet here](#)



## Learning the art and science of cheesemaking

Cheesemaking is an ancient art and may have begun when someone serendipitously stored milk in a preserved animal stomach that caused the milk to coagulate because of the natural rennet. Sampling it, they learned that this is a great way to preserve milk in a concentrated, nutritious form. People have been eating cultured dairy products for over 4,500 years, whether yogurt, kefir, or cheeses. The microorganisms preserve milk and many of them even provide health benefits.

Since first discovered, people have learned to use specific cultures and other processes to develop more than 1,600 types of cheeses, each with a distinctive flavor, texture, and feel. Cheesemakers have learned to develop a “local” flavor that is dependent upon the milk, environment, and cheesemaker.

Many consumers may have only tasted commonly produced commodity cheeses as an ingredient for appetizers, sandwiches, pizza, or compound foods like lasagna. But, for the consumer who recognizes and appreciates the uniqueness and distinctiveness of artisan products, there is a level of cheese flavor and texture that goes way beyond the widely recognized flavor and texture profiles of commodity cheeses. *By Phil Durst*

[View full article here](#)



Photo (by Phil Durst): John Partridge, MSU Associate Professor Emeritus, cutting the cheddar during an Extension Artisan Cheese Workshop.

# Management Tips

MSU Dairy Extension Team

## New skills your farm or food business will need to develop due to COVID-19

One of the outcomes of the COVID-19 pandemic has been for many individuals and businesses to reassess “business as usual” attitudes and actions. For example, in a recent Hoard’s Dairyman “DairyLivestream” webinar, two milk processors were asked what they would do differently today vs. pre-COVID-19. One said they would likely carry more inventory of inputs, challenging the “just in time” processes that businesses have adopted to save cost and free up capital. Having a two-month supply of key inputs would have allowed them to better maintain their processing capacity. The processors also indicated that they have learned the need to have more regular conversations with suppliers and customers, looking at the cost/benefit of every decision.

Have you used this COVID-19 experience to reassess your business and business practices? Where could processes and practices be changed or improved to set your business up for the future? Would a fresh perspective and a different skill set help you determine and make these changes? If you believe there are some key areas that your business needs to improve in, but you lack the personnel or the skill set to make the changes, the COVID-19 pandemic may have set the stage for some opportunities to arise.

*By Florencia Colella and Stanley Moore*

[View full article here](#)



## The economic impact of duration of antibiotic treatments for mastitis

Much of what we think we know about how to treat mastitis is based on protocols that were developed decades ago when most mastitis was caused by contagious bacteria such as *Streptococcus agalactiae* and *Staphylococcus aureus*. Most Michigan dairy producers have done a great job in controlling these pathogens and bulk tank SCC values in Michigan are among the best in the world. While the continued decline in bulk tank SCC is a great indication that subclinical mastitis is increasingly controlled, the incidence of clinical mastitis remains stubbornly high on many farms. Even in herds with low SCC, it is not unusual for about 25-35 % of the cows to have at least one case of clinical mastitis each year. Treatment decisions about those cases can have a significant economic effect. We recently collected disease and treatment data on 40 larger WI dairy farms that contained about 53,000 lactating cows. On these farms, 34% of the cows experienced a case of clinical mastitis and about 70% of those cases were treated with commercially available intramammary antibiotics. The direct costs of mastitis treatments (drugs and milk discard) averaged \$147 per case of which 74% was accounted for by milk discard costs. The farms had considerable variation in treatment costs which was primarily based on how many days they administered antibiotics. The duration of treatment for FDA approved intramammary antibiotics ranges from 1.5 to 8 days and few cases likely benefit from treatments beyond that on the label.

*By Pamela Ruegg, DVM, MPVM*

[View the full conference paper here](#)



# Management Tips

MSU Dairy Extension Team

## A new online record keeping tool is available for conservation planning

Nutrient management planning for farms is important for both economic and environmental growth and stability. Keeping records of nutrient management practices that you implement on your farm is critical for several reasons. Records allow a farm to balance nutrients with regards to crop requirements and soil nutrient levels. Additionally, they can help make future management decisions by comparing and contrasting practices that have been successful and those that have not been as successful or have failed. This increases your efficiency. Furthermore, good record keeping can aid in giving consumers confidence in the agriculture production practices used to make their food, which is important to your marketing strategy.

Basic record keeping components of nutrient management planning include:

- Soil and manure analyses
- Other sources of contributing nutrients
- Crop rotation and crop yield goals
- Actual yield
- Fertilizer application and method
- Time of year and weather forecasts
- Identification of any sensitive areas

By Erica Rogers and Sarah Fronczak

[View full article here](#)



## But they're family!

Family businesses, including family farms, create opportunities to: build great relationships; accomplish goals together, nurture skill development in the next generation, and see the business continue beyond the current generation. Family businesses can also challenge: work vs. home life balance, conflict resolution skills, communication, and succession of the business.

According to a 2012 Harvard Business School study, the top three reasons that family businesses fail are: lack of clear leadership structure; inability to separate business from personal; and inadequate preparation to handle complex issues such as succession, exit or death of a partner, and growth of the business.

Family businesses can improve their chances of success by thinking through some critical areas before they bring on new family members as employees or partners. These areas for consideration include Hiring, Management/Ownership Opportunities, and Exit Strategies.

Hiring family employees can often look very different from hiring non-family employees, but should it? As a Michigan State University Extension Educator, many farms that I work with insist on a formal break between the time where a son and daughter see work as "chores", and when they are formally hired. This break could be college, or it could be a period of employment outside of their family farm. The break also creates an opportunity to set a more formal working relationship, including an interview.

By Stanley Moore

[View full article here](#)



# Management Tips

Brandon Van Soest, Miriam Weber Neilsen, Barry Bradford,  
Mike VandeHaar, and Faith Cullens

## Should we be feeding transition milk to dairy heifer calves?

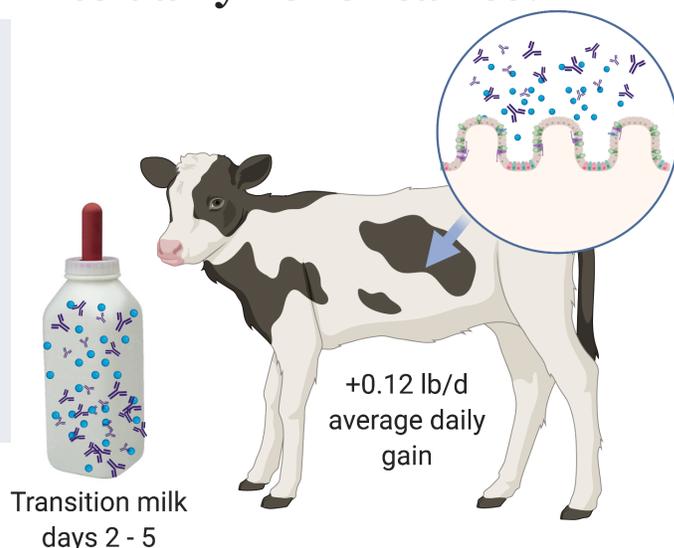
Dairy producers have long understood the importance of quickly providing newborn calves with colostrum – the first secretion from the udder after the cow gives birth. However, little attention has been paid to transition milk, produced in the 2nd through 4th milkings after calving. As the udder gradually transitions from colostrum production to making mature milk, this intermediate milk not only contains more energy and protein than mature milk, but also includes immunoglobulins and other potentially beneficial factors.

Transition milk can be collected into the bulk tank just as mature milk is, but this approach may fail to capture the full value of this milk. In a study conducted by Michigan State University investigators, calves were provided colostrum, then fed 2 quarts of transition milk three times per day for 9 feedings prior to receiving milk replacer on day 5 of life. These heifer calves were compared to peers fed 2 quarts of milk replacer at each feeding after colostrum feeding. Heifers fed transition milk achieved greater weaning weights (+6.6 pounds on average). Additionally, both the published study as well as a follow up study (publication in progress) found improvements in observational health scores and blood health markers when calves were fed transition milk.

While this initial study did not dive further into the reasons that transition milk confers these benefits, the follow-up study showed that transition milk stimulates development of the digestive tract through cell proliferation (increasing cell numbers) which ultimately increases small intestinal surface area and potential nutrient absorption. Calves not receiving transition milk may be missing out on the opportunity for increased gut development and improved health.

To justify the feeding of TM on farm it must be feasible, economical, and beneficial. Dairy managers should consider the value of additional weight gain and improved calf health in their operation, keeping in mind the evidence that improved early-life growth and health may result in increased lifetime milk production. Based on relationships from an analysis published in 2012, the 0.12 lb/day increase in average daily gain in this study would be predicted to result in 387 lb of additional first-lactation milk yield.

On the other hand, implementing transition milk feeding would come at some cost. Dairy farms may see increased cost of labor and supplies for collection, pasteurization (if desired), storage, and reheating transition milk. For farms currently discarding transition milk, this feeding approach could prove to be an attractive option. Likewise, in a herd with an automated milking system, the collection may be as simple as making a few adjustments to the robot and having an additional tank to separate transition milk, but logistics would likely be more challenging on other farms. An alternative option is supplementing milk replacer with a colostrum replacer. In the published study, feeding a 50:50 blend of colostrum replacer and milk replacer achieved growth and health responses similar to those from feeding transition milk. Although this approach is appealing from a labor standpoint, it may be difficult to justify feeding 150 grams of relatively expensive colostrum replacer per feeding on top of the milk replacer cost.



[View full article here](#)

# Research Drill Down

Mike VandeHaar<sup>1</sup>, Rob Tempelman<sup>1</sup>, and Kent Weigel<sup>2</sup>  
Michigan State University<sup>1</sup> and University of Wisconsin-Madison<sup>2</sup>

## Feed Saved - The next step in breeding a more efficient cow?

*Feed accounts for half the costs on most dairy farms. Thus, cows with greater feed efficiency, meaning those cows that need less feed for each pound of milk they produce, are likely to be more profitable. Cows that are more efficient also need less land per pound of milk and will produce less waste per pound of milk. They might also produce less methane per pound of milk. Thus, feed efficiency is a trait well worth considering as a breeding goal, but, until now, it has never been a trait we have focused on in our breeding goals.*

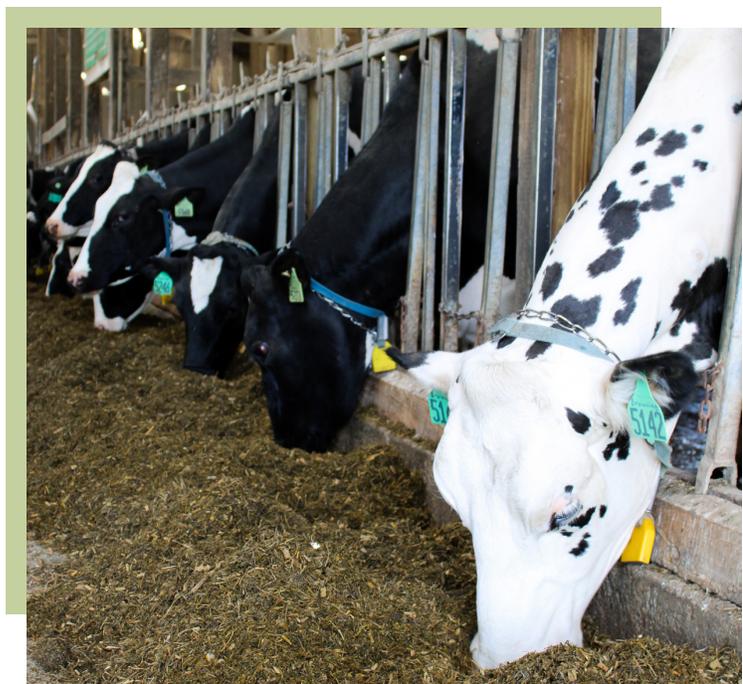
### That is about to change.

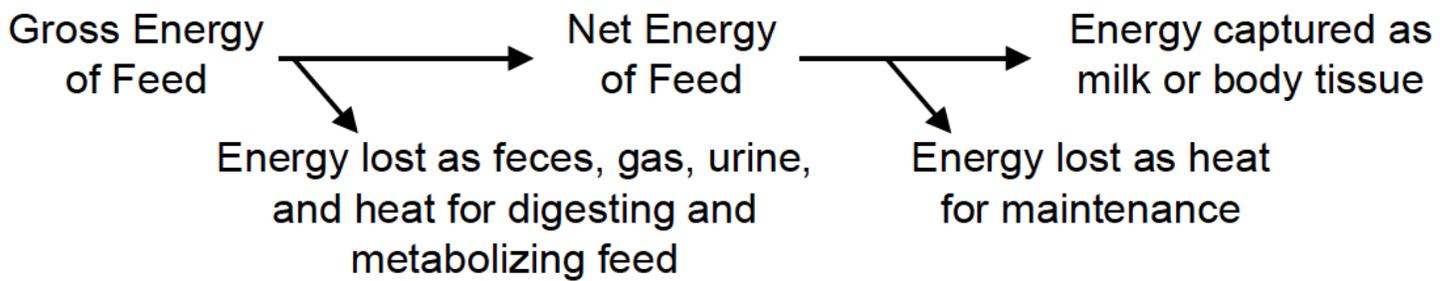
Since the 1990s, we have known that feed efficiency is a heritable trait, based on work from Europe. The problem, however, was that we don't know the feed intake of individual cows on most commercial farms, and we need feed intake to calculate feed efficiency. Traditionally, to estimate the genetic breeding value of new dairy sires, we used data from thousands of his daughters, compared to their herdmates. So direct selection for feed efficiency was simply impossible. The advent of genomics has changed that. Genomics enables us to make faster progress for existing traits, like milk protein or fat yield, and to breed for new traits, like feed efficiency. To do that, however, we need a reference population of cows with known phenotypes for feed efficiency and known genotypes.

Ten years ago, we started a project in the U.S., with Michigan State University and the University of Wisconsin as leaders, to study the genomics of feed efficiency. Our team has both nutritionists and geneticists. We were able to obtain major funding from the USDA National Institute of Food and Agriculture in 2010, and we now have funding from the U.S. Foundation for Food and Agriculture Research and the U.S. Council for Dairy Cattle Breeding (CDCB). Other team members include scientists from Iowa State

University, the University of Florida, and the USDA Animal Genomics Improvement Lab in Maryland. Our goal is to measure feed efficiency on thousands of cows in research herds and develop a database of feed efficiency phenotypes and genotypes that can be used to develop genomic breeding values for feed efficiency.

After ten years of work, we have 5,200 cows in our database, and we are happy that feed efficiency is included as a trait as of the December 2020 genetic update. This trait will be called **Feed Saved**, a term coined by a dairy geneticists in Australia. Feed Saved is actually composed of two parts: 1) the feed saved when a cow is smaller and needs less feed for maintenance, and 2) the feed saved when a cow has a lower **Residual Feed Intake (RFI)**. As long as the resulting daughters from this less-voracious cow produce at least as much milk, with the same protein and fat content, they will be more efficient at turning feed into milk components. To better understand Feed Saved, let's consider its two parts separately.





**Figure 1.** Energy flow in a cow. Selecting for Feed Saved related to RFI will improve the conversion of Gross Energy to Net Energy, whereas selecting for Feed Saved related to body weight will improve the proportion of net energy that is captured in milk instead of being used for maintenance.

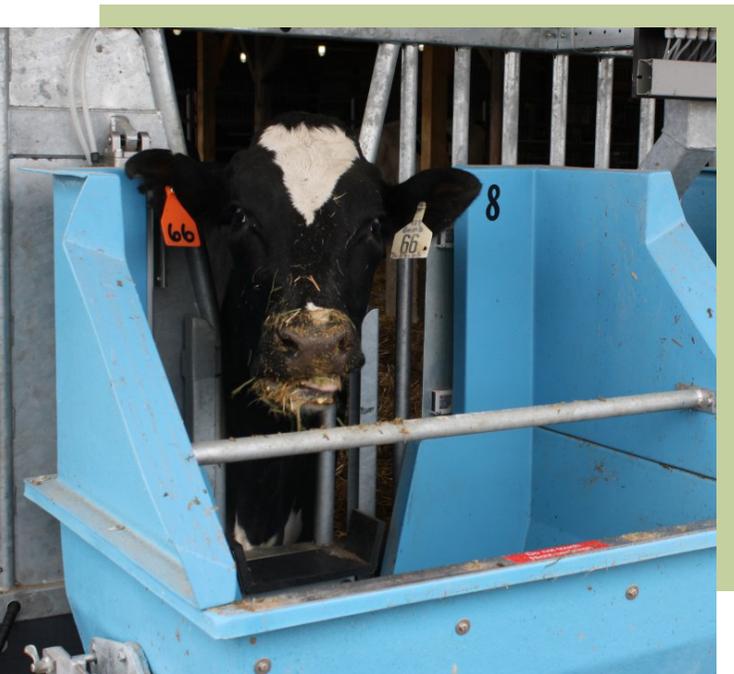
**Feed is saved when cows are smaller but continue to produce as much milk--they produce more milk per unit of body weight.** Cows, like all animals, need some feed every day for maintenance--just to stay alive. The amount of feed energy needed for maintenance is directly related to the cow's body weight. For years, we have been breeding and managing cows for greater milk production. As cows eat more feed, a greater proportion of their feed intake is used for milk and a smaller proportion is used for maintenance. This is commonly called the "Dilution of maintenance". Today's dairy cows produce 5 times more milk than their predecessors 80 years ago, and, although they are also a little larger and they eat more, their feed efficiency had doubled due to the dilution of maintenance.

Data from our current studies, along with other recent studies, indicates that the maintenance cost

penalty assigned to larger cows in NM\$ has been too small and should be doubled. This penalty includes extra feed expenses incurred by large animals during the rearing and dry periods, as well as added housing costs, but large cows receive credit for greater salvage and calf values. For U.S. dairy cattle, the maintenance requirements and associated rearing costs and salvage values are based on the body weight composite (**BWC**), which is comprised of five linear type traits: stature, strength, body depth, dairy form, and rump width. The new Feed Saved trait incorporates all of the above net costs associated with BWC.

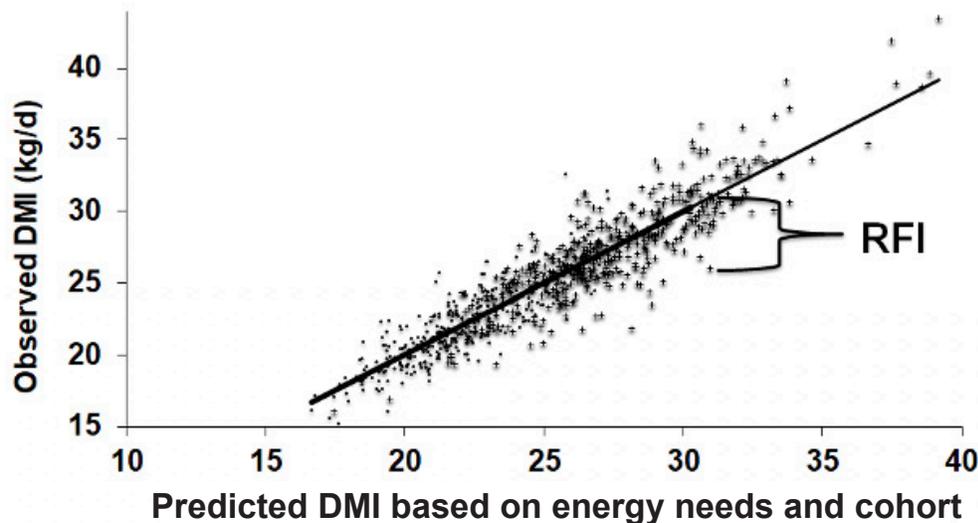
**Feed is saved when cows have lower residual feed intake (RFI)--they eat less than expected based on their milk production, body weight, and body weight change.** When cows eat feed to obtain nutrients for maintenance or milk, they must first digest and metabolize feed ingredients to the metabolites that are actually used by cells for maintenance and milk synthesis. For energy, they convert the "Gross Energy" of the feed to "Net Energy" (see figure 1).

Some cows are more efficient at this than others. Those with a positive RFI eat more than expected; we cannot justify their greater intake, so they are less efficient. In contrast, cows with a negative RFI eat less than expected; thus, they are more efficient. Our studies have shown that the heritability of RFI is 17%, making it more heritable than foot/leg type traits (15%) and only slightly less heritable than milk yield (20%). So, it is clear that we can make progress on this trait. Of course, it is very important that selection for RFI does not decrease health or fertility or milk production. We typically focus on three energy needs when computing expected DMI and comparing the relative efficiency of dairy cows: energy required for lactation, energy required for maintenance, and energy required for body weight change (growth or added body condition), as shown in Figure 2.



**11** Cows fed in feed intake monitoring systems like this are providing data to understand the genetics of feed efficiency.

**Figure 2.** Illustration of residual feed intake (RFI), where RFI represents the difference between observed dry matter intake (DMI) and expected DMI. Energy needs and expected DMI are based on milk energy output, body weight, body weight change, parity, and days-in-milk within a cohort of animals fed the same diet at the same place and time.

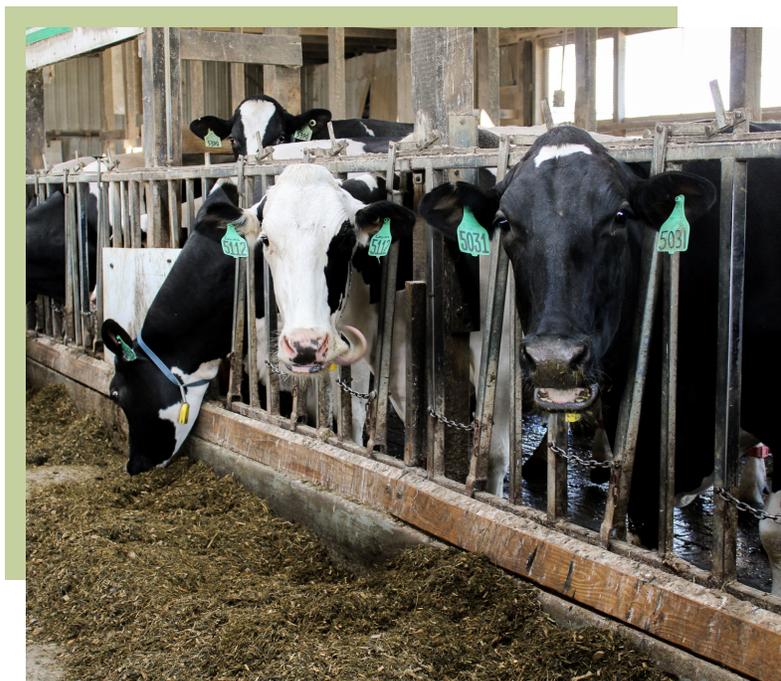


To measure RFI, we measure milk yield, milk composition, body weight, body condition score, and DMI for approximately 42 days in mid-lactation. We chose the time period between 50 and 200 days-in-milk, because that's when cows are in peak lactation, and when their body weights and body condition are relatively stable. We can compute the RFI of each cow from these data, by comparing her actual DMI with the expected DMI of a cow of equivalent body weight, milk yield, milk composition, body weight change, days-in-milk, and parity over the study period. All calculations are done within a cohort, where a cohort is cows fed the same diet at the same place at the same time. RFI is the deviation from expected based on the cohort – this is the same concept as the deviation from herdmate that we've used in routine genetic evaluations of other key traits for decades. To keep genomic evaluations for RFI, and thus Feed Saved, up to date, we must continue measuring feed intake on individual cows every year for the reference population. This will continue to require significant investments of time, money, labor, and technology on research farms, but the resulting information can be used to compute **PTAs** for feed efficiency of all cows, bulls, heifers, and calves in the national population.

### Incorporating Feed Saved into Net Merit

*We expect Feed Saved to assist dairy producers in breeding cows of moderate size that can convert consumed feed into milk and body tissue even more efficiently than they do now. Said another way, it will help dairies avoid breeding cows that waste feed in achieving and maintaining excessive body size or waste too much energy as feces, gas, urine, and heat.*

Mathematically, the formula for Feed Saved puts weights of -138 on PTAs for BWC and -1 on PTAs for RFI; because both weights are negative, larger values of Feed Saved are desirable. The standard deviation of PTA values for Feed Saved is about 109 pounds per lactation, so significant genetic variation exists between animals, and Feed Saved PTAs of the top 100 NM\$ bulls range from -183 to +395 pounds per lactation. The genetic correlation of Feed Saved with milk production is near zero, due to the way RFI is computed, and correlations with health and fertility traits range from zero to slightly antagonistic – these traits will be monitored closely, to ensure that gains in feed efficiency are not accompanied by losses in health, fertility, or longevity. Reliabilities (**REL**) of Feed Saved will be a challenge, due to small size of the genomic reference population



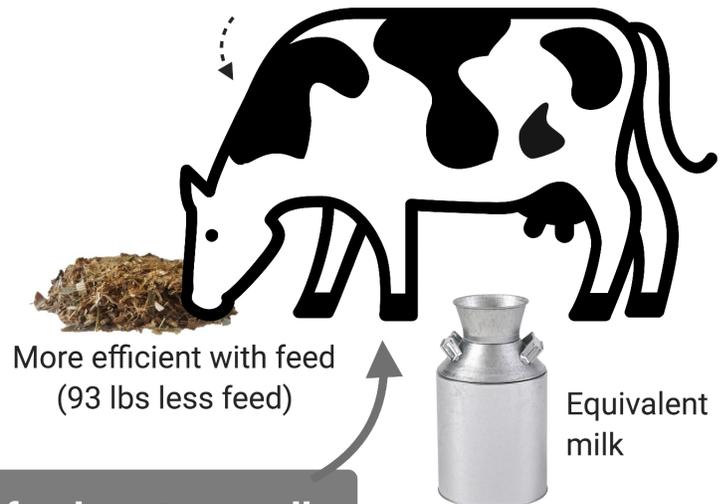
Feed Saved: 0 lb / lactation

Average body weight



Feed Saved: +193 lb / lactation

Lower body weight (100 lb less feed)



**+\$19 income over feed cost annually**

for RFI, and we expect average REL of Feed Saved for young, genome-tested calves to be about 37%.

On the other hand, the economic value of Feed Saved is quite large, and the relative economic weight proposed for eventually incorporating this new trait in the **Lifetime Net Merit Index (NM\$)** is about 21% (roughly 40% for BWC and 60% for RFI). Net Merit will continue to focus on increasing milk protein and fat yields, but our expectation is that addition of Feed Saved into NM\$ in the coming years will provide an extra \$8 million per year in net profit to U.S. dairy farmers, and these gains will accumulate over time.

Introduction of routine CDCB genomic evaluations for Feed Saved is a big step forward, and the result of a decade of university research. Our work is not finished, though. Beyond adding roughly 750 new cows to the genomic reference population each year, we are collaborating with international partners who can contribute cows to a larger global reference population, developing proxies to predict DMI from inline milk analysis systems, wearable sensors, and computer vision algorithms, and carrying out intensive nutrition and physiology studies that will advance our understanding of metabolic regulation, methane emissions, health, and fertility. This work will advance continued improvements in the efficiency and sustainability of the dairy industry.

## Meet the Authors



**Mike VandeHaar**  
Michigan State University



**Rob Tempelman**  
Michigan State University



**Kent Weigel**  
University of Wisconsin-Madison

# Michigan Dairy Recognition

Shining a light on industry leaders



## **Brent and Emily Simon selected as the 2020 MMPA Outstanding Young Dairy Cooperators**

Driven by the goal of producing high-quality milk, Brent and Emily Simon, Westphalia, Michigan dairy farmers, are focused on sustaining their family, employees and livestock for years to come. The Simons were recently selected as the 2020 MMPA Outstanding Young Dairy Cooperators (OYDC) by a panel of judges represented by leaders in the Great Lakes dairy industry.

The Simons operate a quality award winning farm with 930 cows and 2,300 acres. They are members of the MMPA Mid-Michigan Local in District 6 and were one of several finalists invited to the annual OYDC Conference held August 11. *By Michigan Milk Producers Association*

To view full article, visit: [www.mimilk.com](http://www.mimilk.com)



## **Carla Wardin featured in Hoards Dairyman for her article “Human diets would suffer without cows.”**

Removing U.S. dairy cows may reduce nutrient supply while having little effect on greenhouse gas emissions, according to the Journal of Dairy Science.

“Our investigations into the impacts and alternatives when removing dairy cows from U.S. production agriculture suggest that GHGE (greenhouse gas emissions) changes would be minor, equivalent to 0.7% of total U.S. GHGE,” stated the authors of the paper *Contributions of dairy products to environmental impacts and nutritional supplies from United States agriculture*.

To view full article, visit Hoard’s Dairyman at [www.hoards.com](http://www.hoards.com)



## **Brian Troyer recognized for his efforts in support of the Great Lakes Regional Dairy Conference (GLRDC)**

Brian has been involved in planning the GLRDC event since 2004. Currently, he is the chair of the Executive Committee and is in charge of sponsorship. For the first several years, he was primarily involved with sponsorship and general planning committee work.

Outside of planning for GLRDC, Brian works for Caledonia Farmers Elevator as a Dairy Financial and Management Consultant. He is also on the Michigan Dairy Memorial Scholarship Foundation Board of Directors, Michigan Livestock Exposition Sale Committee, and helps with the MSU Dairy Challenge team. Thanks to Brian for his service to the Michigan dairy industry!

**MICHIGAN STATE**  
**UNIVERSITY**

**Extension**

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

**Follow us!**



Dairy at MSU



@DairyMsu



Dairy at MSU