FARM REPORT

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FROM THE PRESIDENT'S DESK: FREE FATTY ACIDS IN BULK TANK MILK

An elevated concentration of free fatty acids (FFA; ≥ 1.2 mmol FFA/100 g of milk fat) in bulk tank milk is a concern for dairy farmers and their milk processors as it can lead to poor milk quality such as off-flavor, rancidity, reduced foaming ability, and problems with cheese coagulation. "What causes FFA in milk?" "What can I do about it?" These are some of the common questions that we have received in our milk lab over the years. Most of the research on high milk FFA has been done in Europe and not surprisingly is multifactorial. To provide a North America perspective, University of Guelph researchers have recently evaluated the associations of bulk tank milk FFA with farm type, facility and management factors, and time of year and reported their findings in the Journal of Dairy Science and JDS Communications.

Types of Lipolysis that Increase Milk FFA

Free fatty acids in milk are the result of the "breakdown" of milk fat (i.e., triglyceride). A milk fat globule membrane (MFGM) protects the triglyceride. However, if the membrane is damaged for some reason, a lipoprotein lipase, an enzyme, will cleave the triglyceride into 3 FFA and a glycerol molecule. There are 3 types of lipolysis that can occur:

- Induced lipolysis – Physical stress on the MFGM during milking and transport can lead to FFA. For example, pipelines with smaller diameters, long lengths, many turns, or elevated sections can increase the risk of MFGM damage.

- Spontaneous lipolysis – A higher concentration of endogenous lipoprotein lipase occurs in milk increase the risk of lipolysis. This is more common in cows that are later lactation, are lower producers, have greater somatic cell counts, are feed-restricted, or experience a sudden feed change.

- Bacterial lipolysis – Psychotropic bacteria grow in warmer or dirty environments and produce lipolytic enzymes that increase the risk of FFA. This is more common when milk is cooled to slowly or improperly cleaned equipment.

Farm Type Related to Milk FFA

A study with 3,771 farms in Ontario over 53 months from 2018 to 2022 found that milk FFA varies among farm type, months, and years. Conventional farms had the lowest FFA (0.83 mmol/100 g milk fat) with 7% of monthly averages ≥ 1.2 mmol FFA/100 g milk fat. Farms with grass-fed herds had the highest FFA (1.10 mmol/100 g milk fat) with 23% of months with elevated FFA. Organic

See FREE FATTY ACIDS, Page 5

REFINEMENT OF PAIRING CALVES

There have been several studies evaluating the effectiveness of pair-housing calves in the preweaning period. Justification for keeping calves separate have been to reduce disease transmission and individualized care, less competition for milk, and limiting cross-suckling. All of these in theory should also support improved performance (less morbidity, mortality, and more growth) in the preweaning period. Previous studies that have evaluated pairing have shown positive effects on this management practice in the preweaning period. Cattle are social animals so there is thought that isolation in early life can limit the calf's development. The benefits of pair housing have been shown to be improved solid feed intake, growth and reduced stress. It also helps with calves' fear of new feeds and improves the affective state and cognitive development of these animals. A limitations with previous studies is that they've been underpowered in evaluating the health of animals paired at different ages, with most focusing on behavior, growth and intake. Most studies have also only compared two time-points of pairing which might be a challenge in determining the most appropriate time to group calves because of the main health challenges in the preweaning period. Those are: diarrhea, which often affects calves in the first three weeks of life and then Bovine Respiratory Disease (BRD) which has the highest risk 1 month of age or later. However, to wait to pair and avoid these periods of highest risk might miss the most optimal time to get the benefits of pairing.

A recent study published in the *Journal of Dairy Science* (108:2839-2855) evaluated three different pairing ages on performance, health, and behavior. They used 140 calves (70 pairs) to pair early (6-7 days of age), intermediate (29-30 days of age) and late (49-50 days of age). All calves were weaned at 78 days of age. Calves were fed and managed similarly. Calves were fed pasteurized waste milk with milk replacer (22% CP, 17% Fat) to achieve 14% total solids. The allowance of milk went from 4 L/d to 8 L/d after two weeks and was reduced over four weeks to facilitate weaning.

The mortality rate was low (<1.5%) with no difference in mortality across treatment. There was no difference in diarrhea or incidence of bovine respiratory disease (BRD). However, calves paired at 30 days of age did have BRD 11 days earlier compared to late-paired calves. Early-paired calves exhibited fewer idle behaviors and more exploratory behaviors compared to intermediate or late paired calves. Early-paired calves had higher odds of engaging in social behavior, while there was no difference between intermediate or late-paired calves. Calves that were grouped earlier exhibited more allogrooming (grooming others).

During two time periods of the preweaning period, cross-suckling was evaluated. The first compared calves that were paired early versus intermediately. There were no differences between these two groups. And the second period compared all three groups. Furthermore, the researchers did not detect any differences in cross-sucking behaviors between all three treatment groups. However, they did note that calves paired either at the intermediate or late timepoint did exhibit more non-nutritive oral behaviors.

Age at pairing did not impact growth up to 30 days of age and calves averaged ~1 kg/d (2.2 lb). However, at 50 days of age early calves had higher average daily gain compared to late-paired calves. An interesting finding was that the early-paired calves had more consistency in their growth compared to the other groups, which would be helpful in managing more consistent animals within a group. Starter intake was twice as high for early-paired calves in the first two weeks of life, and this continued as these calves consumed more starter for the first 30 days of life compared to late-paired calves.

Overall, this study adds to the support of pair housing calves. It further demonstrates that there is a critical time to pair calves, which is likely within the first three weeks of age. There appeared to be limited benefits of pairing calves at 30 days compared to pairing calves at 50 days of age. Health challenges are likely something you will have to continue to manage in a calf rearing system but there could be benefits of pairing that might further benefit calves as they get started in your program.

— Sarah Morrison
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2nd Annual Miner Legacy Run — May 10, 2025

Join us to help support CVPH nursing programs!
National Nurses Week is May 6 – May 12, 2025 and to honor the amazing nurses in the North Country, we have teamed up with the CVPH Foundation to support nursing education and nursing work.

Register here: https://runsignup.com/Race/NY/Chazy/MinerLegacyRuN

THREE THINGS I AM GOING TO MISS ABOUT CORTEVA BMR

The recent decision by Corteva Agriscience™ to phase out brown midrib (BMR) corn by 2030 has some forage producers reeling. Indeed, I know several farms in close proximity to Miner that have grown BMR exclusively for their high-producing herds in past years. As you can imagine, they aren't too excited about the news that BMR will be going away. And, for that matter - neither are we. BMR corn silage has been a mainstay in the Miner Institute forage program for many years and here are three reasons why:

Digestibility

The primary reason that BMR corn is grown is, of course, fiber digestibility. Over the years, we have found that a good BMR hybrid runs 8-12 percentage points higher in 30 hr. NDFD than a typical non-BMR dual purpose corn taken for silage. This digestibility increase comes along with a corresponding decrease in undigestible fiber that has the potential to cause gut fill limitations in high-producing cows.

Growing BMR not only increases the efficiency of the cow, but it also increases the use efficiency of harvest equipment as well. This is because the "extra" undigestible fractions in non-BMR corn still must flow through the harvester, get hauled to the farm, and be packed in the bunk - all at the farmer's expense. Then this undigestible fiber is fed out to cows, it passes through the cow, and the farmer gets to pay to haul it again as manure. It is easy to make the argument that we would be much better off if we could eliminate some of this undigestible fiber to begin with. In other words, grow BMR.

Consistency and Dependability

Corn silage digestibility varies considerably from year to year, but the digestibility difference between BMR and non-BMR is consistently there. Since corn is a high-yielding crop that is direct chopped, it ends up being one of our most uniform forages from field to field and harvest day to harvest day. Alternative sources of highly digestible fiber include grasses and winter forage. However, these forages are much more difficult to get to a consistent moisture content and be harvested on time.

Particle Size

Those who follow Miner Institute research closely are sure to know that particle size is a big deal around here. It wouldn't be, however, unless it was a big deal to the cow as well. Time spent at the bunk, for example, is greatly influenced by the particle size distribution of the TMR. When it comes to length of cut for a forage, we are looking for small and consistent. As long as most of the fiber particles stay on top of a 4 mm screen in a shaker box, we have not compromised the effective fiber of the forage.

What does this have to do with BMR, you say? Well, I have run a great deal of BMR plots through the research chopper at Miner and there is no doubt in my mind – BMR chops better. At the same chopper setting, the BMR particles were smaller and more uniform than the non-BMR corn samples. We could literally see the difference just by putting two samples side by side. Although people don't often grow BMR because it chops well, I believe that the smaller particle size distribution is, in part, responsible for the excellent animal response that we see with BMR on the farm. Yes, we can adjust the chopper to achieve smaller particle size in conventional corn, but this increases chopping time and fuel consumption. From a practical standpoint, BMR always wins.

While Corteva appears to be committed to their decision to phase out BMR completely, it certainly wouldn't hurt to tell Corteva why the dairy industry needs BMR to stay. There are, of course, downsides to growing BMR as well; standability, disease resistance, and lower yield for instance. But we have not found any of these to be a game stopper at our location in Chazy, NY. On heavier soils, we have found that BMR has similar or even greater digestible dry matter yields to conventional corn, and we plan to continue planting it as long as we can buy it.

— Allen Wilder
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BYE-BYE BMR?

By now many of you have learned that over the next few years Corteva Seeds will end its sales of BMR corn hybrids. This is expected to be done by no later than 2030 but could be a year or two sooner. There are several reasons for this decision, including (not necessarily in order of importance):

- Lower yields compared to standard corn hybrids, with an increasing BMR "yield drag". While I've been a long-time proponent of BMR corn hybrids, and Miner Institute has used them for many years, I've mentioned the yield drag problem before, noting that there's no sign of it decreasing.
- Decreased sales of BMR hybrids, not only because of yield drag but the ever-increasing dairy herd size and the need for simplicity and efficiency in feed programs. About half the silage harvested in the U.S. is fed to beef cows, which has never been a good market for BMR corn.
- Difficulty in incorporating the newest genetic traits into BMR hybrids. In the past I've referred to BMR as "your grandfather's corn" since even though it's been commercially available for decades most BMR hybrids contain few if any of the most desirable traits.

This doesn't mean the end of BMR; not only are there BMR versions of summer annuals including sudan-sorghum hybrids, but because the BMR gene isn't patented other seed companies can — and to a limited extent do — sell BMR hybrids. What we don't know at this point is how much of the demand for BMR corn silage will be satisfied by one or more of these seed companies. Many dairy farmers in the upper Midwest and Northeast rely on BMR corn silage, just not enough to justify Corteva continuing to satisfy this market.

This decision will almost certainly place a bigger focus on the performance of standard corn hybrids that have undergone some selection for NDF digestibility. So far I've been underwhelmed with progress to date (based on university corn silage hybrid trials), but we need to also pay attention to the digestibility of reduced stature (AKA "short corn") hybrids. These hybrids under development by several seed companies, are several feet shorter than standard corn hybrids. A considerable acreage of short-stature hybrids are being planted in the Midwest this year.

We don't know much about the use of short-stature corn for whole-plant silage. But in spite of its height I'm encouraged by a statement from Iowa State University's Mark Licht that the stalks in reduced-stature corn hybrids contain less lignin. Just as the low lignin content of BMR corn results in higher NDF digestibility, the low lignin content of reduced-stature corn may produce similar results. And the yield difference between the two types might not be all that great. We'll need to wait for yield and quality data before we draw any conclusions about the adaptability of short-stature corn as whole-plant silage, but there's reason for optimism.

— Ev Thomas
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A FEW COMMENTS ABOUT AI

To dairy farmers the term "AI" refers to artificial insemination, but to the rest of the world AI is Artificial Intelligence. I'd been trying to ignore the whole AI frenzy but I recently bought a new computer equipped with something called "Copilot", which Microsoft calls "an AI companion". As I type this Copilot seems to be looking over my shoulder, making what it considers helpful suggestions when I create a sentence it deems needs improvement. This usually involves punctuation or adding or removing a word. Despite my generally negative attitude toward AI, I must admit that sometimes the suggestion was an improvement. Other times I've told Copilot to get stuffed, that I prefer my precious prose. So far the suggestions have been minor and mostly helpful, but it will be a cold day in the hot place before I allow Copilot or any other form of AI to do anything more than make minor edits. And while I can't speak for the other Farm Report contributors, I expect that what you read in this newsletter will be by the author of the article and not the product of AI.

— Ev Thomas

* Remember when Ev didn't need a computer because he had an electric typewriter?

– Wanda Emerich

SPRING THINGS

Because this newsletter reaches a wide audience we need to generalize about the timing of "spring things" such as planting and alfalfa stand evaluation. That said, following are a few things farmers should be thinking about as we head into the new growing season.

Nitrogen fertilization of grasses — If you don't apply some form of N — fertilizer or manure — the value of yield and forage quality may not be enough to cover the cost of harvest. This is backed by both Cornell University and Miner Institute research. In a replicated trial at the Institute, spring N application doubled first cut yields and increased crude protein from 12 to 18%. The ideal time to apply N is just as your grass breaks dormancy, but better late than never since much of the fertilizer not used by the first crop will be used by the regrowth.

Alfalfa stand evaluation — This may be tricky since alfalfa plants with damaged crowns (often from field traffic the previous year) may green up and seem to be OK, but look for plants with regrowth that's somewhat shorter than on other plants. These may produce some first cut yield, but dry weather will probably result in the death of many of these damaged plants. I've dug up a number of these "iffy" plants, and it's amazing how much crown damage they can sustain and still survive the winter. What you do with these fields depends on the extent of the damage and the condition of the companion grass crop (if any). If there's a decent stand of grass, topdressing with manure right after first cut may be just what the (crop) doctor ordered. The N in the manure will not harm the alfalfa.

Spring tillage — A lot of damage can be done by tilling when the soil is still too wet, including some problems that can't be corrected by secondary tillage. This is especially important with clay loam soils: I've seen corn that was a total failure after a clay loam was worked when it was wet. (The results could be even worse with small-seeded crops such as alfalfa.) Research has shown that there's little yield advantage to corn planted May 1st vs. that planted two weeks later, so don't be in too much of a rush. When you finish corn planting — ideally, by June 1st — is probably more important than when you start.

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FREE FATTY ACIDS, Continued from Page 1

farms were intermediate with an average FFA of 0.89 mmol/100 g milk fat and 12% of months with elevated FFA. Interestingly, FFA varied during the year with the lowest FFA occurring in May for all farm types. Additionally, monthly FFA values varied year to year.

Facility and Management Factors Related to Milk FFA

A study involved 293 dairy farms in Ontario and British Columbia. Researchers visited the farms to survey milking systems, assess cow diets, and gather 30-day average bulk tank FFA values. The overall average was 0.84 mmol FFA/100 g milk fat with 10% of farms having elevated FFA.

- Milking system – Farms with nonparlor milking systems (e.g., AMS and pipelines) had higher FFA
- Milking frequency – Farms with milking frequencies of ≥ 3 times per day had higher FFA particularly in AMS and tiestall milking systems. Parlor farms did not have elevated FFA regardless of milking frequency
- Milk filter change frequency – Not changing the milk filter as least 2 times per day was associated with higher FFA in farms milking ≥ 3 times per day.
- Pre-cooling milk – The absence of pre-cooling milk was associated with higher FFA.
- Fat supplements – The use of fat supplements in lactating diets was not associated with FFA; incomplete diet reporting was a limitation of the study suggesting further study of dietary factors with FFA is appropriate

The researchers suggested that spontaneous lipolysis affected by milking frequency and bacterial lipolysis affected by milk pre-cooling and milk filter change frequency did affect milk FFA more than induced lipolysis. However, these factors didn't explain all the FFA variation so the researchers suggested that there are likely more risk factors such as nutrition, bulk tank cooling and agitation settings, and individual cow factors. Looks like there are still a few more questions to be answered.

— Heather Dann
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A 3D VIEW OF FEED ADDITIVES FOR ENTERIC METHANE MITIGATION

There have been increasing partnerships between different groups over the years to tackle the problem of greenhouse gas emissions (GHGs) from agricultural production and improve the environmental footprint of the agricultural sector. One of these coalitions is "The Global Research Alliance on Agricultural Greenhouse Gases" (GRA) launched in December 2009, with a current membership of 68 countries across the world including affiliates, with partners like the World bank, Consultative Group on International Agricultural Research (CGIAR), African Development Bank, European Commission, Food and Agriculture Organization (FAO), Global Methane Hub, World Farmers Organization (WFO), and other relevant organizations.

The GRA focuses on four broad research groups which are the Livestock, Paddy Rice, Croplands, and Integrative Research Groups, which helps to narrow down research efforts and scientific knowledge specific to reducing GHGs from the individual sub-sectors. The overall aim of the GRA is to combat climate change from an agricultural standpoint and increase agricultural production to meet the growing demand for quality food globally. As part of its arms, the GRA also has flagship projects which bring together experts in specific research areas pertinent to its collective goal. There are currently six flagship projects which are Agroecology & Agroforestry to Mitigate Climate Change, Economics of Cattle GHG Mitigation (EMiFa), Ensuring Long-Term Mitigation and Adaptation Co-Benefits, Feed Additives to Reduce Methane, RUMEN Gateway, Reducing N_2O Emissions and Improving Accounting, and Satellite Monitoring to Improve Livestock Management.

The first output of the Feed Additives to Reduce Methane flagship project was published as a special issue in the Journal of Dairy Science in January 2025. This flagship project was developed by the Livestock Research Group and Feed and Nutrition Network, and it is titled Technical Guidelines to Develop Feed Additives to Reduce Enteric Methane. It brought together 60 leading researchers from 46 institutions across 23 countries. The special issue contains six articles that elaborately and wholistically discuss this subject. In introducing the articles, Dr Michael Kreuzer (professor emeritus at ETH Zurich, Lindau, Switzerland) said "The flagship's main goal is to accelerate the development and use of feed additives to assist in reducing global enteric methane emissions from ruminant livestock. Its purpose is also to provide the scientific community and livestock sector with technical guidelines on good practices for developing and testing feed additives." The titles of the six articles are:

1. Feed additives for methane mitigation: A guideline to uncover the mode of action of antimethanogenic feed additives for ruminants.
2. Feed additives for methane mitigation: Assessment of feed additives as a strategy to mitigate enteric methane from ruminants—Accounting; How to quantify the mitigating potential of using antimethanogenic feed additives.
3. Feed additives for methane mitigation: Modeling the impact of feed additives on enteric methane emission of ruminants — Approaches and recommendations.
4. Feed additives for methane mitigation: Recommendations for identification and selection of bioactive compounds to develop antimethanogenic feed additives.
5. Feed additives for methane mitigation: Recommendations for testing enteric methane-mitigating feed additives in ruminant studies.
6. Feed additives for methane mitigation: Regulatory frameworks and scientific evidence requirements for the authorization of feed additives to mitigate ruminant methane emissions.

The authors highlighted the difference between the efficacy and effectiveness of antimethanogenic feed additives (AMFA). According to them, the former is based on results from controlled interventions while the latter relates to results from real-world conditions. Some key points and recommendations from the articles (in order of how they are listed above) are:

1. The effectiveness of an AMFA in in-vitro (laboratory) or in-vivo (live animal) studies should be confirmed, as well as its safety for animal production and health, before more resources are channeled to determine its mode of action.
2. Efficacy and effectiveness must be considered in accounting for the mitigation potential of an AMFA. A life cycle assessment is also important to determine the wholistic impact of an AMFA.
3. Models should be tailored to specific situations, for example, the outcome of adopting an AMFA would be different between a pasture system and an intensive system. Also, peer-reviewed sources are highly recommended as data sources for modeling.
4. In determining the right AMFA to adopt, it's recommended to start with in-vitro systems that allow more products to be tested per time, and then the more promising ones (based on the in-vitro results) can be used in in-vivo testing.

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WHAT'S HAPPENING ON THE FARM

Spring has arrived! Or so the calendar says. Although we have had a few days in the 60s which feels like t-shirt weather up here in Northern New York, most of our days are in the 30s-40s and the nights in the 20s-30s, and we are still getting a few bouts of snow. Here at the farm we have to adjust with the frequent weather changes. We are constantly opening and closing the barn doors, as well as monitoring the curtains in each of the barns to make sure our cows are comfortable. Each barn has a different setting based on the needs of the cows in the barn. Cows have a lower thermal neutral zone temperature of 32° to 77° whereas calves have a higher one. Calves have a thermal neutral zone between 59° and 82°.

In our 2004 barn, which is home to 350 of our lactating dairy cows, as well as in our milking parlor, we use the Polymat G3 through the company Ventec. These are inflatable air curtains. This allows the cows to be as close to a pasture-like setting, while keeping them in the comforts of our freestall barn. These curtains allow lots of natural light in, eliminating the need for extra interior lighting, while keeping the cold and wind out. They are temperature controlled and will open and close in all of the different types of weather that we experience here at Miner Institute.

In our newer dairy barn, where we have over 230 lactating cows, as well as 75 dry cows and prefresh heifers, we have Norbco ventilation curtains. There is a bottom curtain and a top curtain which allows for more customized airflow. The curtains can be rolled up and down in increments to get the desired ventilation. The top curtains roll to the top and the bottom rolls to the middle. These curtains can be automatically or manually opened and closed based on the current temperature settings.

In our calf barn and transition heifer barn, we have the same brand of curtains as our newer barn, however they have a sensor that can detect temperature, humidity, wind and rain, and they will open and close based on the weather. These curtains are very durable and allow 80% of sunlight in when fully closed. In the summer, when open, it allows for a wide open sidewall for maximum airflow.

— Rebecca Sprang
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METHANE, Continued from Page 6

5. Long-term studies are needed as we consider the effects of AMFA. When two or more AMFA are used in a study, the efficacy and mode of action of the individual AMFA should be determined. The gas measurement technique adopted should not adversely affect the normal behavior and productivity of the study animals. The constituents of an AMFA should be determined before animal studies to avoid any harmful impacts on the animals and humans.
6. The regulatory approval of AMFA is based on jurisdiction, but the major consideration across all jurisdictions is that the AMFA is effective in reducing enteric methane emissions without any detrimental effects, and this must be proven with scientific data. It is also recommended that farmers and other stakeholders should be informed of the pros, cons, as well as appropriate usage of approved AMFA.

As we continue to address the questions of efficacy, effectiveness, and sustainability of feed additives in rumen methane mitigation, these articles provide useful information for researchers, farmers, and the dairy industry at large to think through these issues more systematically.

— Gift Omoruyi
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NOTABLE QUOTES

- Sometimes I think the surest sign that intelligent life exists elsewhere in the universe is that none of it has tried to contact us.

  – Calvin (Calvin and Hobbes, by Bill Watterson)
- When a clown moves into a palace, he doesn't become a king, the palace becomes a circus.

  – Old Turkish proverb
- Love is the triumph of imagination over intelligence.

  – H.L. Mencken
- Every construction site has a guy who says “Measure twice, cut once” and a guy named Stumpy.

  – Scott Carson

— E.T.

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Jacob, Laura, and Matt from our environmental research team participated recently in World Water Day, a public outreach event at Champlain Centre Mall in Plattsburgh.

Closing Comment

In life it's important to know when to stop arguing with people and just let them be wrong.

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