FARM REPORT

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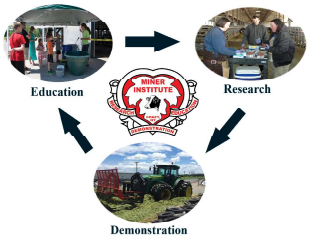

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FROM THE PRESIDENT'S DESK: WRAPPING UP 2023

Carrying on William Miner's vision of science in the service of agriculture grows more important each year as agriculture and its role in society evolve at warp speed. At the close of each year, reviewing the Institute's accomplishments always fills me with tremendous satisfaction and gratitude for our Miner team and our mission.

Dr. Rick Grant, center, stands with his predecessor as Miner Institute President, Dr. Charlie Sniffen, right, and his successor Dr. Heather Dann at the recent Cornell Nutrition Course in October.

In 2023 over 2,000 people attended 39 on-site educational and community events. Thousands more were impacted by our staff participation in various virtual conferences. Nearly 70 students enrolled in our educational programs including undergraduates, graduate students, and interns. Students remain one of our most impactful products as they enter the dairy and equine worlds at all levels of leadership.

Our staff garnered $1.5 million in grants and contracts to support research. Funding remained strong in our core areas of forages, dairy cattle nutrition and management, and environmental aspects of dairy farming. While conducting this research, our staff made 49 presentations to various scientific and industry groups and wrote nearly 60 scientific and industry-focused articles. That is a large footprint for our modest sized, but talented staff!

Our dairy herd remained highly productive in 2023 - kudos to our farm and crops staff for keeping the herd in the top echelon of US dairy farms. Conducting research and education programs with our high-performing dairy herd remains one of our greatest assets. On the equine side, we had another successful year and planning continues on our future multi-purpose riding arena.

The full story of any organization surely lies behind the simple year-end statistics. But our student programs, research activity, and outreach tell me that the Institute is on-track, and our staff is doing an outstanding job. We have a lot planned for 2024 – and as always, if you have questions about the range of Miner Institute programs – research, education, and demonstration – please contact us.

On a personal note, I will be retiring as

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THE GHOST OF CHRISTMAS PAST

On a night before Christmas
In his office aloft
Dr. Grant laid his pen aside
Having written some parting thoughts

A small table lamp cast a warm pool of light
On his finished "From the President's Desk", the last one he'd write
He stood at the window, his hands clasped behind
And watched the snow fall, the flakes gossamer-fine

A creak of the door brought his head 'round
But over the worn threshold, not a soul would be found
He went back to the desk, its character he knew well
And reflected back happily on twenty years at the helm

Exactly when he dozed off, he surely couldn't tell
But a strong, guiding voice in his dream boomed a knell
"You've carried my mission forward, Rick, your legacy will shine,"
"Now set down the yoke, friend, for to rest it is time."
"The future is bright, with Dr. Dann as the face,"
"No other is so worthy to step into the traces."

Rick awoke with a start, to the window he dashed
Tore open the shutters and threw up the sash
The snow lay deep, not a footprint in sight
To suggest anyone was out on this deep winter's night

As he pinpointed the voice, a smile creased his face
For such an influential tone no time could erase
He turned for the door, and reached for the light
And whispered into the dark:
"Thank you, Mr. Miner, Merry Christmas and goodnight."

— Cari Reynolds
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A CENTURY OF PHILANTHROPY IN THE NORTH COUNTRY

On December 29, 1923, William Miner signed a document creating The William H. Miner Charitable Trust. Renamed The William H. Miner Foundation five years later, this Foundation ushered in a century of unparalleled philanthropy for New York's North Country. Miner amassed the funds for his Foundation from his railroad equipment company, W. H. Miner, Inc., founded in Chicago a quarter century earlier.

Miner's biographer, Dr. Joseph Burke, wrote that William Miner "maximized the impact of his gifts by confining them largely to a single county in the Champlain Valley." A century later, the impact of William Miner's Foundation still reverberates throughout Clinton County and beyond.

The Foundation provided a permanent endowment for three institutions that Miner created: Physicians' Hospital in Plattsburgh, Chazy Central Rural School (CCRS), and an agricultural experimental college built at Heart's Delight Farm in Chazy which became the William H. Miner Agricultural Research Institute.

Miner was a strong believer in the Country Life Movement that sought to improve quality of life in rural areas in the early 20th century. With his philanthropy, Miner wanted to apply science to farming and bring high quality education and health care to rural Clinton County.

In 1916 eleven country schools were consolidated and Chazy Central Rural School was born. Working with George Mott, a local proponent of modernizing rural schools, William Miner created the foremost consolidated rural school of the early 20th century and provided the children of Chazy with all the advantages of any urban school. His educational legacy endures to this day as the Miner Foundation continues to fund a wide array of programs at CCRS.

William Miner planned that his beloved Heart's Delight Farm would evolve into a college with courses in both the theory and practice of farming. He envisioned education and research programs for "training worthy young men and women" who would "advance the science of agriculture." Miner Institute was founded in 1951 and its mission today rests squarely on William Miner's vision a century ago. Modern-day Miner Institute depends in large part on continued funding from the Miner Foundation to conduct its programs in agricultural research and education.

A separate endowment was established after the death of Miner's wife, Alice, named the Alice T. Miner Endowment to benefit Physicians' Hospital, a state-of-the-art medical complex which Miner had completed in 1926. Now known as Champlain Valley Physicians Hospital (CVPH), the Foundation has provided substantial funding to the hospital over the years and William and Alice's names are attached to such facilities as the Alice T. and William H. Miner Medical Arts Building and the Alice T. Miner Women and Children's Center. Most recently, in 2022 a pledge of $1.2 million from the Miner Foundation funded CVPH's Educational Career Advancement Program designed to foster professional growth of the hospital's workforce.

Though the Miner Foundation specifically provides annual funding for these three entities, the present-day Miner legacy in the Champlain Valley is larger still. Alice and William created the Alice T. Miner Museum, a colonial revival museum opened in the heart of Chazy in 1924 that remains a tremendous community resource. In the 1920s Miner also purchased the Kent-Delord House in Plattsburgh to preserve it as a museum of the revolutionary war era that operates to this day.

It is a testament to William Miner's vision for the North Country that the institutions he created in the early 1900s still exist all these years later. Although much has changed since 1923, his legacy lives on in the school, hospital, and agricultural research institute he founded and that his Foundation still funds. As the Miner Foundation marks a century of existence, it is exciting to imagine what William Miner's philanthropy will bring to the North Country in the next 100 years.

— Rick Grant
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** This article also ran as an op-ed in the Press Republican on Nov.15, 2023.*

PLANNING AHEAD

Benjamin Franklin said that "By failing to plan, you are planning to fail." This certainly applies to crop production, where the decisions dairy farmers make this month can have a significant impact on forage inventories (and quite possibly milk production) a year or more from now. In previous newsletters we've noted that fertilizer prices have decreased considerably, giving farmers a chance to catch up on fertilizer applications. Some farmers may need some expenses to reduce their income tax liability :Ordering (and paying for) 2024 fertilizer needs this month is one way to do so. And if you're not checking fertilizer prices with two or more dealers before ordering you may be missing out on an opportunity to save some money.

Farm equipment will continue to be quite expensive relative to a couple years ago. Some equipment purchases can be postponed, but I don't see lower equipment prices on the horizon so if you have a piece of "tired iron" critical to crop production perhaps you should bite the bullet and replace it. Focus on any implements that would allow you to get crops planted or harvested in a timely manner.

In previous newsletters I've discussed the importance of feeding fully-fermented corn silage — ensiled for at least two months -- which for some farmers means providing an additional month or more of corn silage for one year. Are you one of these farmers? If so, have you started taking steps for harvesting or buying this additional corn silage? If not, why not? There's more milk potential in every mouthful of fully-fermented corn silage due to almost linear increases in starch digestibility. As a means of increasing milk production and/or reducing your grain bill, this should be a "no-brainer".

— Ev Thomas
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WEIRD PLANT NEWS

The latest in weird plant news from the Crop Dude:

According to a recent article in *The Economist*, scientists have found that plants can not only detect sounds but react to them as well. Scientists have been playing music to plants since the 1960s, everything from Beethoven to rock and roll. One recent experiment found that an Asian shrub grew larger leaves when exposed to eight weeks of Buddhist chants, but had no response to pop music. (Make of that what you will.) Another found that traffic noise stunted the growth of marigolds and sage plants, which produced a number of stress compounds. Chinese researchers found that in the controlled environment of a greenhouse, certain noise frequencies can affect seed germination and increase crop yields. Some farmers claim that singing to their cows makes them produce more milk; perhaps they should start singing to their crops — but go easy on the rock and roll.

If plants respond to sounds, do they also react to other stimuli? Yes: A botanist-entomologist duo from Texas and Missouri found that the vibrations made by caterpillars as they munched on plants resulted in the plants producing much higher levels of defensive chemicals, making them a lot harder for the caterpillars to eat. Other sources of vibration, including wind and insect species that crawl on the plants but don't eat them, had no effect. This research has been successfully replicated many times using cress and tobacco plants, and with a variety of caterpillar species. And it turns out that the chemicals the plants release to cope with insect attacks are the same ones that protect the plants during cold weather. This is all quite interesting, but is there a practical application? Yes again: It may be possible for drones equipped with speakers and the right sound files to send a warning when pests are first detected but are not yet widespread. The system could even be used to prepare crops for cold snaps, something that should be of interest to the owners of orchards and vineyards.

Finally, not only do plants react to sounds, but they might also be able to produce them. Tobacco and tomato plants were put inside a microphone-lined box. Half the plants had been watered; the other half were not. A similar trial compared two sets of plants, half which had their stems cut and the other half left intact. The microphones picked up very little from the healthy plants, but both the unwatered and the cut plants made plenty of noise though at frequencies undetectable to humans. And different stresses produced unique sounds. *Experiments using corn and wheat produced similar results.* If plants are broadcasting SOS signals, it may someday be possible to wire a field with microphones to help farmers detect problems before they become visible.

— E.T.

REDUCING ENTERIC METHANE EMISSIONS: A COLLECTIVE EFFORT

I was elated to attend the 85th Cornell Nutrition Conference in Syracuse, NY from October 17th-19th. It was an impactful 3-day event packed with insightful sessions, seasoned speakers, and enthusiastic participants from different parts of the United States and other countries. The variety of attendees and the cordial atmosphere allowed everyone to network and share information and experiences. I was excited at every opportunity to exchange business cards with other participants. The speakers dealt with various nutrition topics but I was drawn to the greenhouse gas mitigation and environmental sustainability sessions. There was a lot of emphasis on one of the US dairy industry's environmental stewardship goals: to achieve greenhouse gas neutrality by 2050. Achieving this goal would require a concerted effort from the government, industry leaders, researchers, producers, and every stakeholder in the livestock value chain.

A highlight for me was the talk "Realistic Thoughts On Enteric Methane" by Jed Asmus, a nutrition consultant from California. A key issue he addressed is how producers can be assisted in making the right decisions regarding mitigating enteric methane (CH_4) emissions. A first step would be to create awareness among producers about the necessity of reducing greenhouse gas emissions. According to Asmus the discussions about greenhouse gas emission reduction are not going away, so producers should be encouraged to take on these efforts and be willing to play their roles to meet environmental sustainability goals. California, being the leading dairy producing state, is currently at the forefront of setting goals and enacting regulations to combat climate change. One of the climate goals is to reduce CH_4 emissions to 40% below 2013 levels by 2030. The California Climate Commitment also includes cutting greenhouse gas emissions 85% by 2045. Farmers will need help to make informed decisions on the appropriate ways of achieving these goals. To help identify the best way forward, the California Department of Food and Agriculture under the Office of Environmental Farming and Innovation established the Livestock Enteric Methane Emission Reduction Research Program to provide grants to fund research studies evaluating dietary strategies and additives that can reduce enteric CH_4 emissions. The state has also installed 131 anaerobic digesters to convert CH_4 from manure into renewable natural gas in dairy and beef cattle systems (Savage, 2023). In US dairy farms, 19% of greenhouse gas emissions come from CH_4 in manure management systems (Rotz et al., 2021), and the large-sized farms in CA make the implementation of anaerobic digesters more feasible compared to smaller farms. These pace-setting endeavors by the government of CA would imply an adoption of similar climate smart goals by other livestock producing states in the US.

Asmus identified some areas of consideration that can support the reduction of enteric CH_4:

1. Research to determine suitable products and procedures that can be adopted for enteric CH_4 reduction. Nationally and globally, research has been geared towards the in-vitro screening of plants and various additives to determine their potential to reduce CH_4, and the inclusion of some of these additives in farm trials. The feedback from these studies have however shown a tradeoff between enteric CH_4 reduction and a negative impact on other parameters like dry matter intake. Additional research is needed to determine additives that will give optimal results without adverse effects on the animals.
2. Regulatory efforts to provide oversight for implementing these measures. He advised that regulators should ensure producers do not bear the brunt of additional costs and taxes, and the market for carbon credits should be easily accessible.
3. Economic and production benefits that should accrue to producers who adopt these products.

Other speakers addressed some of the practical challenges that these benchmarks impose on farms. Dr. Sara Kvidera from Elanco noted that the safety, efficacy, and return on investment of these additives need to be assessed. Likewise, Dr. Ananda Fontoura and Dr. Joe McFadden from Cornell University indicated the need for more research to validate the technologies and protocols currently being used for enteric CH_4 measurements to ensure more accuracy and precision.

In conclusion, improving the environmental footprint of the US dairy industry requires more concerted efforts, and discussions about greenhouse gas reduction and environmental sustainability will be a recurring theme in the coming years.
The conference ended too quickly, and I asked, "When is the next Cornell Nutrition Conference?"

— Gift Omoruyi
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FARMER SELF-EXPLOITATION

When you hear the term exploitation, what do you first think of? Maybe you imagine child laborers mining rare metals, or a boss taking advantage of a young employee. If you're a farmer, I'm sure your first thought wasn't of your own exploitation. Before you roll your eyes and move on to the next article, try and hear me out.

Exploitation is defined as 'The action or fact of taking advantage of something or someone in an unfair or unethical manner; utilization of something for one's own ends'. When I think about the farmers I know, and the work that they put in, I know that many fall under this category. You may ask how, if in the definition of exploitation, it is specified that that exploitation is happening as a means to someone else's ends, how can a farmer exploit themselves? This is where a new term comes in. Philip Howard, a professor of sustainable agriculture at the University of Michigan, uses the term farmer self-exploitation. We all know farming is difficult – if it wasn't, there would be more farmers. In a technical sense, self-exploitation would apply to farmers who take on disproportional debt without reasonable means to repay it. They work themselves, their family, and their employees to the bone because that is what is normalized in this industry. They would then spend years trying to pay back this debt with no hope in sight. This happens for many reasons, but largely because farmers, either first generation or tenth generation, have a deep desire to continue to work the land, and find farming inherently rewarding. And, of course, farming can be financially rewarding at times. If it wasn't, there would be no more farmers.

This topic is touchy, but I raise it for good reason. Long term exploitation eventually leads to burnout, and in extreme cases, abandonment of farm operations. When we talk about sustainability in agriculture, often our first thought is of greenhouse gas emissions, or runoff causing eutrophication. Sustainability can be imagined as a three-legged stool: one leg is environmental sustainability, one leg is economic sustainability, and one leg is social sustainability. Self-exploitation affects the second two legs. Long term economic and social sustainability are vital to maintaining and growing the dairy industry. If we as farmers cannot self-reflect and realize how inequitable our own work is and make strides to de-normalize exploitation in the workplace, dairy operations will continue to shut down. Farmer self-exploitation is so common in this industry that it is expected, hard to point out, and can even be embarrassing to admit. Of course, not all farmers experience self-exploitation. But when we think about how the landscape and image of dairy farming has changed for the last fifty years, it's hard not to see how long-term burnout has had damaging effects.

So how can we combat the burnout that stems from exploitation? My personal goals would be restructuring how the burden of production, farm debt, and responsibility for the public image of dairy farming could be distributed. On a more reasonable scale, one action item farmers can participate in would be reflecting on their own situation, and addressing how exploitation might be affecting them. Have you thought that it might be easier to just quit farming? Have you been jealous of people who get to relax on a beautiful summer night, or a frigid winter morning? Part of the mission statement at Miner Institute is education. I see this as not just educating students who come to the farm, but also educating consumers on the realities, both harsh and beautiful, of farming, and educating farmers on best practices - including how to remain sustainable in all three forms. Farmers and farming communities must be lifted up by those who are dependent on them: consumers, co-ops, government officials, industry leaders, and everyone in between. Consumer gratitude is important, but so is factual understanding of the contentious issues in dairy farming. At its core, farmer self-exploitation stems from stalwart desire to remain on the land, and to resist the waves of change that the agriculture industry has been feeling for the last century. The cause is noble, and I urge all farmers to take care of themselves, their families, and their workers. The industry needs you and your farm down the line, not just right now.

— Bridget Craig
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president at the end of 2023. Our senior dairy researcher, Dr. Heather Dann, has been named the next president of the Institute by our Board of Trustees. With her vision and leadership, and our dedicated and talented staff, the Institute will surely attain levels of performance in the coming years unimaginable today.

For the twenty-first and final time as president, I close the books on another year, grateful for our Miner team and all they have accomplished to keep William Miner's legacy vibrant a full century after he established his Foundation to benefit the citizens of the North Country and beyond.

— Rick Grant
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SLEEPING ON THE JOB: WHAT COULD IT MEAN FOR YOUR COWS?

At Miner Institute we can assess cow behavior and map out time budgets of individual animals by performing cow watches. To do this we record what each animal is doing (eating, ruminating, lying, walking, etc.) in or outside the pen, every few minutes during a 24-hour period.

While performing cow watches this fall I noticed that we don't typically differentiate sleeping from lying down. If an animal is asleep during a cow watch, either curled up or lying with her head down, it's standard to record that she is "lying in a stall and not ruminating." While technically true, this statistic suggests that she is being inefficient, wasting time that could be spent ruminating. It's difficult to believe that sleeping holds no value to a cow's ability to be an efficient and productive member of the herd, yet little research is available on this topic. I feel that this is an important, but overlooked, area of cow comfort and welfare that requires more research to understand.

Generally speaking we think that sleep is important to animals because although it leaves them vulnerable, they still do it. We can hypothesize that the benefits of sleeping, likely related to metabolic and immune function, outweigh the instinctual risks associated with it. Most animals differ from humans in that they are polyphasic, which means that their sleep occurs in multiple small bouts throughout the day. Cows are no different.

Research by Ruckebusch (1972) of the National Veterinary School of Alfort in France showed that cows sleep an average of 3 to 4 hours per day. Most of this time is spent in non-rapid eye movement sleep (NREM). This is also known as deep sleep. A smaller portion, typically less than one hour per day, is spent in rapid eye movement sleep (REM). This is a lighter sleep stage where dreams can occur (and if you are following the Miner Institute Facebook page and saw our recent post, you know that some cows can have quite the dreams!). As you may suspect, sleeping cows often lie with their head curled in toward their body or laid out flat. However, NREM sleep can also occur while cows are ruminating with their heads raised or even while standing, but this is rare and is thought to occur mainly when cows have to stand for long periods.

In addition to NREM and REM sleep, it's thought that cows can spend up to eight hours per day drowsing in a state between full consciousness and sleep. This often coincides with rumination, mainly during lying time. Sometimes drowsing can be confused with NREM sleep, which is why researchers use EEG (electroencephalographic) technology to study brain activity. Attached to the head using non-invasive electrodes, this is the primary method for studying the duration and stage of sleep in cows. Kull et al. (2019) published a study from the University of Tennessee and the Ohio State University that used this technique to help determine the effects of sleep and lying deprivation on lactating dairy cow behavior. This is the first published study to look at such effects. Consisting of 12 cows in a crossover design, each animal experienced a 24-hour period of sleep deprivation by which they were allowed to lie down but were physically touched when they appeared to be falling asleep. The cows also experienced a 24-hour period of lying deprivation using a wooden grid on the pen floor which prevented sternal recumbency. Cows under both treatments decreased their total sleep per day, suggesting that decreasing lying time through management practices such as overstocking can alter sleep as well. Interestingly, REM sleep decreased but drowsing increased during the treatment periods; this means that either the cows were drowsing while standing to make up for decreased REM sleep or that drowsing was more difficult for personnel to identify and subsequently interrupt. It took multiple days for cows to recover their lying time after each treatment (sleep or lying), showing that the deprivation of either or both impacts welfare. Milk production was not affected by either treatment, and replication is necessary to further investigate if sleep can impact production.

I believe that sleep is necessary and important for cows, but more research can help us explain how and why that is. It would be advantageous to understand this element of a cow's life so that we can use management techniques to maximize animal welfare, determine what a cow does when she is lying down and why it has such an impact on production, and investigate potential other links to animal health, feed efficiency, or something else. Next time you find yourself walking pens, keep a lookout for droopy eyelids and relaxed necks; you may be surprised at how many of your animals are sneaking a nap on the job!

— Alexandria Bartlett
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** Sleeping cow video can be viewed here: https://www.facebook.com/reel/1431637874080654*

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Dr. Rick Grant summarizes 20 years of research during a presentation at the Nov. 30 Dairy Day at Miner Institute, his last as president of the organization. He retires at the end of 2023.
Best wishes in retirement, Rick!

YOUR DECEMBER FARM REPORT IS HERE ENJOY!

Closing Comment

Lack of planning on your part does not constitute an emergency on my part.

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