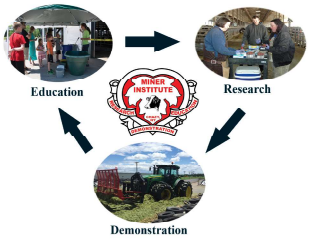
FARM REPORT

In This Issue:



Visit our blog:
minermatters.com

Like us on Facebook

facebook.com/ MinerInstitute

FROM THE PRESIDENT'S DESK: LYING TIME AND WELFARE REVIEWED

The importance of adequate lying time for dairy cattle is a topic that I've written about repeatedly – and for good reason. Research and on-farm experience tell us that the cow's ability to attain her required resting time is central to her welfare.

Last year an excellent review on the topic of lying time and dairy cattle welfare was published by research leaders from University of California-Davis, Aarhus University in Denmark, University of Helsinki, and the University of British Columbia (J. Dairy Sci. 104:20-46.). I should have pointed out this review sooner as it is one of the best I've read on the topic of lying behavior and its fundamental importance to dairy cattle.

The authors do an excellent job of summarizing the consequences for health and well-being when the cow's ability to lie down is frustrated. All the work showing that cows are extremely motivated to lie down is reviewed, and to what extent cows will go to recoup lost resting time.

The best and most unique part of this review is where the authors summarize what is known about lying time and relative risk to animal welfare. In their analysis, they consider 10 to 12 hours daily of lying time as required and a good threshold to consider potential risk to cow welfare. Their summary considers the potential risk to welfare (low, high, or unknown) when lying time is less than 10 to 12 hours per day and when it is greater than or equal to 10 to 12 hours daily.

If we first consider lying time less than 10 to 12 hours per day, there are no confirmed examples where this situation would pose a low risk to welfare. In contrast, lying time less than 10 to 12 hours per day poses a high risk to welfare related to unfavorable lying conditions, time constraints such as too much time away from pen or time spent eating, disease or injury that reduces lying time, and insufficient protection from rain or heat stress.

A third category is interesting to think about: when lying time is low, but potential risk to welfare is unknown or not yet studied. Situations here include estrus, the time around calving, and high motivation to graze or practice other behaviors at the expense of lying down. Sometimes lying time less than 10 to 12 hours a day may not be a risk to welfare, but we need to understand more about these situations.

See **LYING TIME,** Page 2

FERTILIZER PRICES & FALL ALFALFA MANAGEMENT

Industry representatives predict that fertilizer prices will remain high at least into the 2023 growing season. It's been 15 years since we last had "buck a pound" nitrogen and $800+ per ton muriate of potash and DAP. Both potash and phosphate fertilizers have more than doubled in price in the past two years. As we go forward, contributing factors include the high price of natural gas used in nitrogen manufacture, the war in Ukraine (Russia is a large global supplier of potash), and potential Chinese restrictions on its fertilizer exports. The options are to order fertilizer this fall at the current high prices, or wait until spring and hope that prices decrease or at least don't increase any further.

Most farm soils will effectively store phosphorus, and to some extent potassium as well. Plants only use as much P as they need so won't "lush consume" this nutrient. Therefore, the P content of the crop is a poor indicator of available soil P. Soil test P will increase — perhaps rapidly — if you apply livestock manure to meet the nitrogen needs of a corn crop because this results in more P than the crop will use. And once soil test P is built to high levels it may (probably will) remain high for a very long time. The amount of potassium that crops use is determined both by plant species and by available soil K levels. Some species — particularly grasses — will lush consume potassium, and it's possible for heavily manured grasses to contain at least 5% K. Higher K uptake doesn't necessarily mean higher yield or better forage quality, and especially with prefresh dry cows feeding high K forage can cause health problems. Potassium won't leach much except in some sandy, low-organic matter soils. So whether you should apply potash fertilizers "with a teaspoon or with a snow shovel" depends to some extent on soil type, though with current potash prices it's unlikely that any farmers will be reaching for their snow shovel. But both alfalfa and corn harvested for silage remove a lot of potassium from the soil, so if soil test K is low you can't afford to skip a year of fertilization — not even one!

With high fertilizer prices the best nutrient management strategy is to apply no more fertilizer than is needed for each crop you'll plant in 2023, and do so on a field-by-field basis. This isn't a good time to be building soil fertility unless it can be done via manure application. Rely on current soil analyses (where have you heard this before?) and try to ride out the current situation, which is the result of external factors over which farmers have no control.

— Ev Thomas
ethomas@oakpointny.com

LYING TIME, Continued from Page 1

When lying time is at or above 10 to 12 hours per day, the potential risk to welfare is low if the longer lying time is due to comfortable resting environment, plenty of access to resting areas, and no disease such as lameness which can lengthen lying time. However, the risk to cow welfare is high if the greater lying time is related to disease (such as lameness) or some other injury that increases resting time. Again, it's worthwhile to think about the situations where the potential risk of longer lying time to welfare is unknown or not studied. In this case, the authors point out that lying time above the 10 to 12 hours daily threshold could be due to an unstimulating environment (in their words) with not much happening in terms of other activities.

Taken all together, the authors rightly conclude that deviations from 10 to 12 hours per day of lying time can accurately detect a threat to welfare and signal when cows are comfortable. These factors relate to resting conditions such as stall and bed design and maintenance, time budget challenges, heat stress, and lameness.

But there are conditions when measures of lying time alone may not allow us to accurately assess the welfare and comfort of the cow. So, measures of lying time need to be used in combination with cow and housing measures to accurately assess welfare. Rarely, if ever, does a single measure tell us all we need to know. Monitoring lying time is no exception and we must appreciate the overall cow environment to make the best decisions.

— Rick Grant
grant@whminer.com

ALTERNATIVE FORAGE INGREDIENTS IN DAIRY COW DIETS

Alternative forage sources may be needed when low on forage or ingredient availability. These scenarios may dictate the formulation of dairy cow diets. However, maintaining the appropriate fiber level in dairy cattle diets is critical for normal rumen function. To optimize the effect of fiber in the cow it's vital to understand a feedstuff's chemical and physical characteristics and their role in the diet. Potentially, an alternative fiber source such as pelleted oat straw could also be used when there isn't enough neutral detergent fiber (NDF) in the diet but little space for additional forage or concerns about increased particle size.

Oat straw is lower in quality than typical forages like corn silage or alfalfa and grass silages. As the name might imply, this lower quality forage is ground very fine and then pelleted, resulting in a feedstuff that has a small particle size [low physical effectiveness factor (pef)] but a high undegradable neutral detergent fiber concentration via 240-hour in vitro fermentation (uNDF240). Both the physical aspect of the diet and the uNDF240 content influence a dairy cow's ability for greater dry matter intake and milk production.

We recently conducted a study at Miner Institute that included pelleted oat straw in low forage (42.4%) diets fed to lactating dairy cows. We included pelleted oat straw at 10% DM of the diet and compared it to a diet with 10% DM as chopped timothy hay. The timothy hay had less uNDF240 but longer particle size relative to the pelleted oat straw. The rest of the diets included 24.2% DM as conventional corn silage and 8.2% DM as mixed grass hay. The diets were formulated with two different grain mixes to keep crude protein, NDF, starch, sugar, and fat similar. There was a difference in the amount of uNDF240 between

the diets with the timothy diet being higher (9.7 vs 8.9 % of DM) compared to the pelleted oat straw. This was a result of the grain mixture, because the uNDF240 of the chopped timothy hay (15.8% of DM) was lower than the pelleted oat straw (23.3% of DM).

Cows fed the pelleted oat straw diet had higher dry matter intake (66.4 vs. 62.6 lb) and 3.5% fat-corrected milk (110.2 vs. 107.8 lb), but lower feed efficiency (FCM/DMI; 1.66 vs. 1.72) compared to cows fed the timothy diet, respectively. The lower uNDF240 and smaller particle size of the pelleted oat straw diet elicited approximately 1.4 hour/day less total chewing (eating and ruminating) than the higher uNDF240 timothy diet. The two diets had relatively small effects on rumen fermentation, nutrient turnover, and total tract nutrient digestion. Both diets contained moderate (8.9% DM; pelleted oat straw diet) to higher (9.7% DM; timothy diet) uNDF240 content and it is possible that chopped timothy hay and pelleted oat straw would respond differently in a lower uNDF240 diet with differing proportions of other dietary ingredients that may influence the amount of fermentable carbohydrates in the diet (i.e. starch).

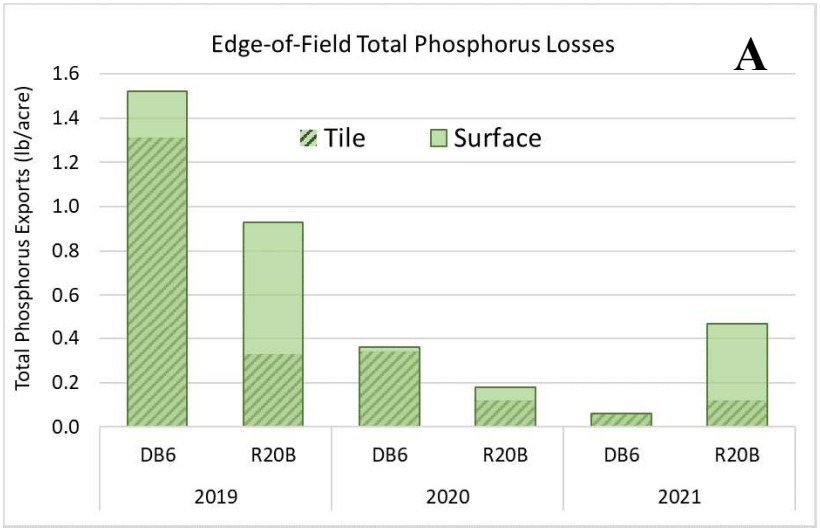
A consideration when feeding an ingredient like pelleted oat straw is the difference between how you would typically measure particle size of the ingredient versus how it is functioning in the cow. As a result of the pelleting process the pelleted oat straw had a pef of 0.99 based on the fraction retained on the 1.18-mm screen, which when combined to the NDF fraction of the diet on that screen and above stimulates chewing activity and creation of the rumen digesta mat.

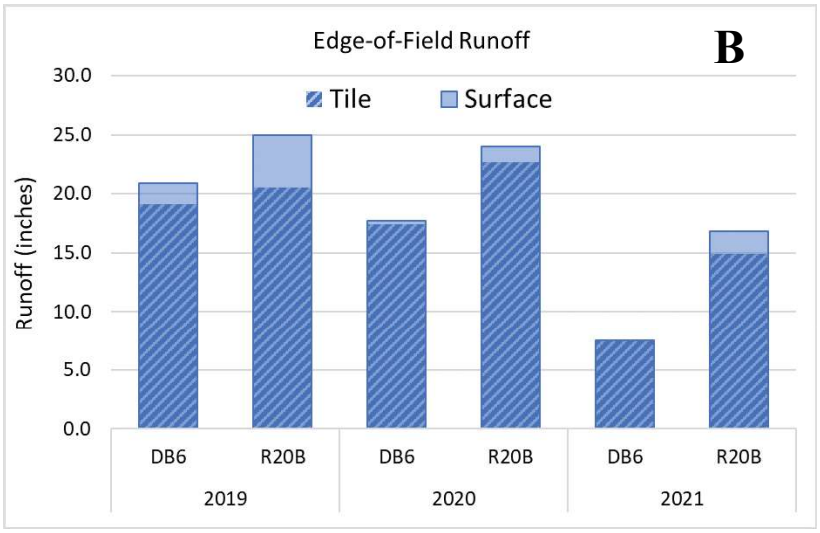
However, when these pellets reach the rumen we suspect that the fine particles in the pellet break apart easily and will result in a lower physical size in the rumen. This is supported by the lower chewing time of cows fed the pelleted oat straw diet. To demonstrate the disassociation of particles, we soaked pellets in water (shown in the figure) and the pellets disintegrated. After measuring the particle size of the soaked pellets, the pef was only 0.017 (i.e. only 1.7% of the sample was retained on or above the 1.18 mm sieve).

By correcting for this change in physical size of the pellet, once it is in the rumen, we were able to more closely predict the observed dry matter intake of the cows using the combined effect of pef and uNDF240 (peuNDF240) in the diet. Pelleted oat straw may not be a typical ingredient in diets for dairy cows. However, it's an interesting example of how both the physical and chemical attributes of a forage source can influence a cow's ability to consume a specific diet. Overall, we conclude that, with appropriate ration formulation, a pelleted high-uNDF240 fiber source can replace lower uNDF240 chopped hay in high producing dairy cow rations although some loss in efficiency occurs.

— Sarah Morrison
morrison@whminer.com

EDGE-OF-FIELD PHOSPHORUS LOSSES IN A DRY YEAR





In previous issues of this year's Farm Report we discussed runoff and nitrogen (N) losses from one of our edge-of-field (EoF) water quality monitoring studies. To briefly recap, very dry conditions in fall/winter 2020/2021 that continued through the 2021 growing season resulted in substantially reduced tile drainage volumes compared to the previous two years of monitoring. Despite this reduction, we still saw elevated levels of N loss in 2021. Some hypotheses for these somewhat unexpected results were discussed in June's issue. This month we're looking at how the abnormally dry year impacted phosphorus (P) losses.

As can be seen in Graph A, EoF P loads from 2020 and 2021 were substantially lower than 2019 and much closer to the annual loss rates we have observed in other EoF studies (less than 0.5 lb total P/acre/yr). For perspective, approximately 31 lb/acre of total P was applied in 2019 and 2021 (roughly equivalent to crop removal) and 15 lb/acre of total P was applied in 2020. This demonstrates that the extent of nutrient losses is not wholly dependent on the amount of applied P, as the interaction of weather events with the method and timing of the manure applications is equally important. Despite P inputs in 2019 and 2021 being roughly double that in 2020, both fields exported substantially less P in 2021 than 2019. In addition, total P losses from DB6 during 2020 were actually greater than the following year when double the rate of P was applied.

These data likely result from three primary factors. First, there were virtually no snowmelt-driven surface runoff events in 2020 in either field. Snowmelt events following fall manure applications have resulted in the majority of P lost in both surface runoff/drainage (SD) and tile drainage (TD) from both fields. In R20B, the vast majority of P losses have occurred in SD and most of these events have historically been generated by large snowmelt events. The absence of these large melt events in 2020 is likely the primary cause of the drastic reduction in losses in R20B where SD is more frequent. Second, the manure application in R20B was tilled under immediately in 2020, whereas the manure remained at the surface in 2021, the first year that no-till was implemented in R20B. The improved manure to soil contact that occurs with incorporation likely resulted in a smaller pool of soluble P available to both SD and TD. Finally, Graph B clearly illustrates how the abnormally dry period in 2021 resulted in large reductions in TD from both fields. The dry conditions created much more soil water storage capacity in the fields than usual, reducing the usual need for enhanced subsurface drainage rates. As TD was responsible for most P loss from DB6, this reduction in TD led to the lowest observed annual P loss rate from either of these fields.

The importance of incorporating manure to prevent P losses in SD is also demonstrated by the comparison of the P graph with the runoff graph.

See **PHOSPHORUS**, Page 5

USE IT OR LOSE IT?

Farmer experience has confirmed what I've been saying for many years regarding fall harvest of alfalfa: Unless you need the forage, don't harvest alfalfa in the fall. Any talk about a decent crop of alfalfa smothering the stand if it's left to overwinter is just that — talk. What's likely to happen is that the leaflets will drop off the plant following fall freezes, leaving a mostly barren stem that won't smother anything. Those stems sticking through the surface of ice-covered snow can be a plus by permitting air flow through the frozen layer.

If you leave a harvest interval of at least 45 days prior to the last cut it's possible to harvest alfalfa in the fall and not have it winterkill, but research has shown that this may still impose enough stress to reduce first cut yield next spring. Furthermore, the more aggressive cutting management has been—including 30-day or less summer harvest intervals — the more risk a fall harvest imposes. Another challenge is that the high price of fertilizer may cause some farmers to skip a year in topdressing alfalfa stands, further increasing the chances of winterkill. Potassium is antifreeze for alfalfa.

Fall harvest management decisions reminds me of the old Mickey Gilley hit song, "Don't the girls all get prettier at closing time". The yield potential of fall-grown alfalfa (i.e. "closing time") can be deceiving because those big leaflets can make the standing crop look better (prettier) than it really is. Don't harvest alfalfa in the fall unless you're sure there's enough growth to justify the trip. The later in the fall you harvest alfalfa, the more I worry about poor silage fermentation because of the depletion of naturally-occurring fermentation bacteria in the field. For this reason you should always use a commercial silage inoculant on fall-harvested alfalfa and alfalfa-grass. And as for trying to make dry hay during September and October: Good luck!

— E.T.

PHOSPHORUS, Continued from Page 4

While we can see that the vast majority of drainage occurs through the tiles, SD mobilizes the majority of P from the field in R20B. While most P loss from DB6 has been generated by TD, there has been just over 2 inches of total SD (2019-2021), compared with 7.5 inches of SD from R20B. Thus, although the majority of P lost from DB6 was through TD, much more flow was required to generate similar losses to R20B because the P concentrations in SD are generally much greater than in TD. Therefore, if the tile system was removed from DB6, a small amount of increase in SD due to the higher water table could result in similar P losses, but without the myriad agronomic benefits of TD. However, while we see some potential benefit to P conservation goals, don't forget that we are unquestionably increasing our N losses with TD installation, a lose-lose situation for the environment and the farm's fertilizer costs. To help offset these risks, be sure to use practices that minimize N leaching such as cover cropping, PSNT/CSNT analyses, and deliver nutrient inputs as close to plant uptake as possible.

We'll be wrapping up the second of four years of the no-till treatment this fall so be sure to stay tuned to hear more about how no-till and surface manure applications may impact water quality.

— Laura Klaiber
klaiber@whminer.com

Is there something you'd like to know more about?

Email article suggestions to dutil@whminer.com

NEW FACES ON OUR DAIRY TEAM

Within the past couple months, we have filled out our dairy team with a new yearlong intern and two assistant herdspeople! They will tell you a bit about themselves in their own words.

From L to R: Rebecca Sprang, Nicole Stover, and Mackenzie Abbati.

Nicole

My name is Nicole Stover, and I am the yearlong Herdsman Intern. I just graduated from the University of New Hampshire in May, with a Bachelor of Science in Animal Science with a minor in Dairy Management. At UNH, I worked at the university's tie-stall conventional dairy where I milked and fed the herd of registered Holsteins, and worked as a research assistnat in ruminant nutrition. I first was introduced to cows my junior year of college when I participated in the CREAM (Cooperative for Real Education in Agricultural Management) program, where classmates and I worked together in milking, feeding, and cleaning a group of designated cows.

I decided to look at internships post-graduation since I had a need to learn more in the herdsperson role. My job now is exactly what I was looking for, as I learn more and more every day. I work alongside Kevin, Kenzie, and Rebecca to keep our herd healthy and happy!

Rebecca

Hi, my name is Rebecca Sprang and I am the new co-assistant herdsperson at the dairy. I am from a rural county in North East Ohio and was heavily involved in agriculture at a young age. I was raised on a small grain and livestock farm where we grew corn, soybeans, wheat and alfalfa hay mixes. We also raised feeder pigs and steers. I was very involved with 4-H and FFA, where I showed dairy heifers, cows, feeders, and steers, as well hogs and sheep. I was an officer in the FFA, I participated in many Career Development Events (CDEs) and Supervised Agricultural Experiences (SAEs), and I will be receiving my American Degree in October. I am the youngest of 4, I have 3 older siblings, Mary, Christopher and Sarah. I graduated college at The Ohio State University Agricultural Technical Institute in May with my degree in Dairy Management and Production, and moved up to Chazy a few short weeks later. My job at the farm is to help oversee the health of the animals. I closely monitor the cow's health and treat them if they are sick. I keep a close eye on the dry cows, especially if they are close to calving, and I assist if necessary.

Mackenzie

My name is Mackenzie Abbati, and I am the co-assistant dairy herdsperson at Miner Institute. I grew up on a small family farm in Johnstown, Ohio. Growing up I was very involved in 4-H and I showed horses and Pekin ducks at the local county fair. My experience as a member in 4-H sparked a desire in me to pursue a career in agriculture. I graduated high school in 2019 and then started as a freshman, majoring in animal science at The Ohio State University Agricultural Technical Institute. During my first semester, I got a job on family owned Brown Swiss farm in Lakeville, OH, RNR Swiss. It was the first time I had ever worked with cows, and I quickly fell in love with dairy and submerged myself in the industry. In 2021, I graduated with an associate degree in animal science from The Ohio State University. After I graduated, I spent a summer at the William H. Miner Agricultural Research Institute working and learning about dairy farm management through their summer internship program. I really enjoyed my time at Miner and hoped to be back one day. One year later, I was presented with a full-time employment opportunity as a dairy herdsperson at Miner Institute. Needless to say, my fiancé and I packed up everything we owned and moved to upstate New York. So far, I have spent a lot of time enjoying breathtaking scenery, maple flavored soft serve, and of course, working with the Miner herd. I have a big heart for the dairy industry, and I am so honored to be a part of the Miner dairy crew. I am looking forward to my future here at Miner.

CORNELL NUTRITION CONFERENCE: OCTOBER 18 - 20, 2022

For 84 years, the Cornell Nutrition Conference has provided industry leading research and information across the spectrum of animal nutrition to feed industry professionals and nutritional consultants.
Registration: https://web.cvent.com/event/cfb75b4c-2d81-45d2-bde3-70b283939a20/regProcessStep1?rt=yoEDV0myj0-9J1bblnf57Q

Tuesday, October 18, 2022
Pre-Conference Symposium sponsored by Chr. Hansen Animal and Plant Health & Nutrition
Farm to Fork: Pioneering Microbial Science for a sustainable future during unprecedented times
1:10 PM Sustainability from Farm to Fork-Dr. Keith Bryan, Chr. Hansen Animal Health and Plant Health & Nutrition
1:40 PM Microbial Solutions on the Farm to Improve Plant Health, Silage Preservation and Animal Health-Dr. Steve Lerner, Chr. Hansen Animal Health and Plant Health & Nutrition
3:00 PM Microbial Solutions to Increase the Sustainability of Food Production and Reducing Food Waste on a Global Scale-Rebecca Henrickson, Chr. Hansen Food Cultures and Enzymes
3:40 PM Microbial Solutions for You and Me: Human Health Implications-Dr. Gregory Leyer, Chr. Hansen Scientific Affairs Human Health
4:30 PM Wrap Up: Final Comments and Questions for All Speakers-Dr. Kimberley Morrill, Chr. Hansen Animal Health and Plant Health & Nutrition

Wednesday, October 19, 2022
7:00 AM Is This a Good Microbiome? What About That One? How Does the Microbiome Affect Efficiency and Productivity of My Herd?-Dr. Todd Callaway, University of Georgia
8:20 AM Nutritional Opportunities and Challenges with Robot Milked Cows-Dr. Trevor DeVries, University of Guelph
9:00 AM Effects of Seaweed on Dairy Production-Dr. Andre Brito, University of New Hampshire
9:40 AM Presentation of Maynard Graduate Award and Danny Fox Graduate Fellowship-Dr. Tom Overton, Cornell University, Department of Animal Science
10:10 AM Epidemiology of Bovine Colostrum Yield and Brix % in New York Herds-Trent Westhoff, Cornell University
10:30 AM Varying Proportions of Alfalfa and Corn Silage for Lactating Dairy Cows-Dr. Rick Grant, Miner Institute
11:10 AM Farm Systems Diet Modeling of Greenhouse Gas Emissions, Nitrogen Losses & Economic Performance of a Waikato, New Zealand Dairy Farm-Dr. Helwi Tacoma, New Zealand Dairy Consultant
1:00 PM Effects of Heat Stress and Dietary Organic Acids and Pure Botanicals on Gut Permeability and Milk Production in Dairy Cattle-Dr. Ananda Fontoura, Cornell University
1:30 PM Lethal Heat Stress in Dairy Cattle: Unrecognized, Misdiagnosed and Needs Research
Dr. Buzz Burhans, Dairy Tech Group
2:10 PM The Effects of Heat Stress on Cattle Production: A Global Perspective-Dr. Mario Herrero Acosta, Cornell University
2:50 PM Programmatic Developments at Cornell Focused on Feed Additives for Methane Mitigation-Dr. Joe McFadden, Cornell University, Department of Animal Science
3:45 PM Can Feeding Microalgae Decrease GHG Emission of Poultry Production?-Dr. Xingen Lei
4:20 PM Inhibiting Methane Production to Enhance Performance: Is Such a Thing Possible?-Dr. Joe McFadden, Cornell University
5:00 PM The Role of Buffers on In Vitro Digestibility of Encapsulated Amino Acids-Arianna Ferguson, Cornell University

Thursday, October 20, 2022
7:00 AM Inflammation During the Transition Period-Dr. Lance Baumgard, Iowa State University
8:20 AM Graduate Student Research Spotlights
• Does Delaying Oral Ca Bolus Supplementation After Calving Impact Milk Production and Health?-Claira Seely, Cornell University
• Effect of Sheep Grazing Density on Forage Quality and Vegetation Management Success in Solar Arrays-Dr. Niko Kochendoerfer, Cornell University
• Effects of Partial Rumen Content Transplantation and Dietary Betaine Supplementation on Heat Stress Cows-Awais Javaid, Cornell University
• Effects of Dietary Methionine and Calcium Salts Enriched in Omega-3 Fatty Acids on Production and Liver Function in Transition Dairy Cows-Tanya France, Cornell University
9:10 AM Charlie Sniffen Graduate Research Presentation, sponsored by Kemin Animal Nutrition and Health
10:10 AM Effects of Poor Maternal Nutrition on Pre- and Post-natal Growth and Metabolism
Dr. Kristen Govoni, University of Connecticut
10:50 AM What's Taking So Long to Get CNCPS Version 7 Out?-Dr. Mike Van Amburgh, Cornell University
11:30 AM Connecting Whole Farm N and P Balances with Greenhouse Gas Emissions and Carbon Footprints-Dr. Quirine Ketterings and Dr. Olivia Godber, Cornell University

The William H. Miner Agricultural Research Institute
1034 Miner Farm Road
P.O. Box 90
Chazy, NY 12921

Change Service Requested

Non-Profit
Organization
U.S. POSTAGE PAID
Chazy N.Y. 12921
Permit No. 8

Progress on the new barn as of Sept. 12, 2022

Closing Comment

Honesty is the best policy — unless you want people to like you.

www.whminer.org
518.846.7121 Office
518.846.8445 Fax