Cornell Cooperative Extension
South Central NY Dairy and Field Crops Program
Broome | Cayuga | Chemung | Cortland | Tioga | Tompkins
DAIRY & FIELD CROPS DIGEST
Winter 23–24

2024 Winter Crop Meeting

Two Dates / Two Locations

Thurs, January 18
Trade Show
Auburn Sennet Fire Dept
3526 Franklin St, Auburn

Or

Friday, January 19
Dryden VFW
2272 Dryden Road (Rte 13)

Time:
9:15 am Registration
Trade Show *in Auburn only*

10:00 am - 3:00pm:
Speakers | Program

Cost Including Lunch:
$35—Pre-registration
$40—At door

To Register for Auburn:
https://scnydfc.cce.cornell.edu/event.php?id=2295

To Register for Dryden:
https://scnydfc.cce.cornell.edu/event.php?id=2269

Having trouble registering?
Contact Donette @ (607)391-2662
or dg576@cornell.edu

Questions on WCM?
Contact Janice @ (607) 391-2672
or jgd3@cornell.edu

CCA & 1.0 DEC Recertification Credits

Agriculture and Weather Extremes: How Can We Adapt? How do we work with Public Policy? | *Mr. Greg Albrecht, Agricultural Environmental Management (AEM) Coordinator, NYS Department of Agriculture and Markets, NYS Soil and Water Conservation Committee*

Many of the practices and management farmers deploy with their herds and crops for production efficiency also benefit the environment and a farm's preparedness for more extreme weather. This presentation will highlight opportunities to continue that progress, how those practices align with water quality and climate goals, and funding for technical assistance and practice implementation through your local Soil and Water Conservation District's Agricultural Environmental Management (AEM) program.

Current & Emerging Manure Treatments that Impact Manure Nutrient Composition. | *Mr. Jason Oliver, Dairy Environmental Systems Engineer, PRODAIRY*

Overview of manure treatment technologies currently on dairy farms and under development that impact the nutrient composition of manure. This includes separation, and nutrient enrichment technologies that will impact and my enhance, a farmer or their advisor's ability to utilize manure nutrients more efficiently for crop production.

Farm Service Agency—News You Can Use! |
Mr. Mike McMahon FSA State Committee Member

Weed Management Updates: Herbicide Resistant Weeds and Programs to Control Them | *Dr. Vipan Kumar, Extension Weed Scientist, Section of Plant Science (SIPS), CALS Cornell University*

Overview of herbicide-resistant weeds in USA and NYS-scope of the problem and review of history, efficacy of pre and post-herbicide programs in soybean and corn, spray application technologies and weed control, and non-chemical tools for weed control. Includes review of 2023 field studies.

Dairy Sustainability—Where Do We Stand? | *Dr. Quirine Ketterings and Kirsten Workman, Cornell Nutrient Management Spear Program (NMSP) & PRODAIRY*

Reports from the Cornell Nutrient Management Spear Program team will address facets of dairy sustainability from tools to assess dairy carbon footprints, and the benefits of that data for positive PR with local communities and marketing, and on-farm research opportunities to assess sustainability practices.

The **South Central New York Dairy and Field Crops Program** is a Cornell Cooperative Extension partnership between Cornell University and the CCE Associations in six

Cornell Cooperative Extension

South Central NY Dairy and Field Crops Program

We are pleased to provide you with this information as part of the Cooperative Extension Dairy and Field Crops Program serving Broome, Cayuga, Cortland, Chemung, Tioga and Tompkins Counties. **Anytime we may be of assistance to you, please do not hesitate to call.** Visit our website: http://scnydfc.cce.cornell.edu and find us on social media! Facebook, YouTube, & Twitter!

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We put knowledge to work in pursuit of economic vitality, ecological sustainability, and social well-being. We bring local experience and research-based solutions together, helping our families and our community thrive in a rapidly changing world.

Dear Farmers and Others,

As the year draws to a close, may your barns be full, your fields be abundant, and your hearts be content. Your hard work and dedication have nourished not just your herds, but communities as well. Wishing you a bountiful and prosperous New Year ahead. Your commitment to agriculture is the backbone of our world. Here's to a year of growth, resilience, and success on your dairy farms. Happy New Year, and may every day bring you the joy and fulfillment you deserve.

Janice Betsy Donette

SAVE THE DATE

WHOLE-FARM EFFICIENCY
WEBINAR SERIES

Join us for this series on enhancing farm efficiency. Explore innovative practices and cutting-edge technologies to optimize feeding and management

REGISTER NOW

Tuesdays from 12pm-1pm EST, Jan 9th through March 12th, 2024

TOPICS AND SPEAKERS:

- **Precision Feeding -**Betsy Hicks, Margaret Quaassdorff & Joe Lawrence
- **Labor Management -**Dr. Richard Stup
- **Feeding Management -** Dr. Barry Bradford
- **Successful Onboarding -** Mary Kate Mackenzie
- **Managing for High Milk Quality -** Dr. Paul Virkler
- **Maximizing Return on Colostrum** - Dr. Sabine Mann
- **Targeted reproduction programs** - Dr. Julio Giordano
- **Evaluating your repro program** - Dr. Matias Stangaferro
- **Managing dairy replacements** - Betsy Hicks & Margaret Quaassdorff

Cornell CALS College of Agriculture and Life Sciences | PRO DAIRY Education & Applied Research | Cornell Cooperative Extension

Time for Feed Inventory, TMR Audits & Mixer Maintenance

by Betsy Hicks, Regional Dairy Specialist

The new year is a great time to focus on three main areas for your dairy's feeding operation that can set your farm up for profitability through the year.

Completing a Feed Inventory

Completing a forage inventory is not only advisable from a farm business standpoint, but a great idea to have from a feeding standpoint. This past growing season saw lots of variability in quantities harvested that may have been different from past years. Nothing is more frustrating from a nutritionist standpoint, or a cow standpoint, to run out of a feed before you wanted and have to do drastic diet changes. Along with an inventory number, doing a projection for feeding out each forage at current rates will allow you to pinpoint how long each forage will last, or how quickly you need a forage to be fed so that room is made for the coming growing season's crops.

To do an accurate inventory, knowing the density of the crop in storage is key. Dairy One's Master Forage Probe Density Chart (Table 2) shows the Average, Range and Standard Deviation for density of both Hay Crop Silage and Corn Silage. I prefer calculating inventory using DM density, which shows an average of about 14.5 lb/cubic foot. Poorly packed silage will struggle to reach 10-12 lb/cubic foot, while really well packed silage can achieve up to 20 lb/cubic foot. If unknown, it is best to guess on the low side so that inventory isn't over estimated.

Table 2. Summary of Core Samples from 168 Bunk Silos

	Hay Crop Silage (n=87)			Corn Silage (n=81)		
	Average	Range	Std. Dev.	Average	Range	Std. Dev.
% DM	42.0	24-67	9.5	34.0	25-46	4.8
Wet Density (lb/ft^3)	37.0	13-61	10.9	43.0	23-60	8.3
DM Density (lb/ft^3)	14.8	6.6-27.1	3.8	14.5	7.8-23.6	2.9

TMR Audits

If you haven't completed a TMR audit on your diets lately, now is a great time to have one completed on diets of varying bulkiness to ensure TMR mixers are performing as needed. Your extension dairy specialist can come out to shake out a batch of freshly delivered TMR and work with your feeding staff to troubleshoot any problems with feed consistency. When TMR isn't consistent from one end of delivery to the other, cow production can be impacted. Anecdotally, groups that had inconsistent mixes fed historically gained 2-5 pounds of milk after the TMR mix was made more consistent from start of load to end, in addition to gains of butterfat and fewer cases of indigestion. The top ten areas to troubleshoot include equipment wear, mix time after last ingredient, load size, levelness of mixer during loading, loading position in the mixer box, hay/straw quality and processing, loading sequence, liquid distribution, vertical mixer auger speed, and hay restrictor plate settings in vertical mixers (Bill Stone, Diamond V). Different density TMR's should also be analyzed (eg. Lactating vs dry cow TMR's) as mixer wagon performance could be drastically different between these two diets.

Mixer Performance & Maintenance

Another set of areas to troubleshoot for mixer issues include: the mixer running hard or being unusually noisy, any added long stem hay or straw is processed to short (<0.5 inch), any added long stem hay or straw is too long (>1.5 inch), hay or straw "nests" easily visible and not mixed in the TMR, clumps of haylage not broken up and visible on top of the TMR or fall to feed passage, visible grain stripes along the TMR after feed out, visible moisture or liquid feed stripes in the TMR after feed out, clumps or balls of grain and liquid feed not mixed in and rolling out of the TMR, excessive bounce or play on the weigh box readout during mixing and loading, a large negative or positive number on the read out box after discharging the full TMR load (Tony Hall, Lallemand). Any one of these areas being off can be an opportunity to correct for better TMR consistency and higher cow performance.

The new year is the best time to get feeding staff on the same page for mixer maintenance. Each feeder should know what the schedule is for greasing and lubricating, checking chassis and gear box oil levels, as well as monitoring scale performance. Additional points for monitoring include knife performance and replacement, kicker blade wear or paddle and scraper wear, as well as augur discharge wear. Not frequently discussed among feeding crews are the "Plan B's", aka when main mixers go down, weather or equipment aren't cooperative, or someone is sick for the day. Getting crews on the same page for having a consistent daily feeding strategy is key for cow performance!

If you'd like help with feed inventory, troubleshooting your TMR or performing a TMR audit, call Betsy at 607.391.2673 and she'll be glad to help out!

Why all the fuss about pair housing?

By Jennifer Van Os, Department of Animal & Dairy Sciences, UW-Madison Reviewers: Tina Kohlman, UW-Madison Division of Extension Fond du Lac County; Emily Miller-Cushon, Department of Animal Sciences, University of Florida; and Theresa Ollivett, Department of Medical Sciences, UW-Madison School of Veterinary Medicine

Most pre-weaned dairy calves in the United States and Canada are housed individually. However, current research shows benefits to raising calves in well-managed pairs or small groups with full social contact. Housing calves with at least one companion can improve animal welfare, calf growth, and consumer perception. Although the impact on calf health is less clear, many of the benefits of pair housing are promising for the vitality and sustainability of the dairy industry. A growing number of producers have found when raising dairy calves, two heads (or more) are better than one.

Social Development Companionship: is important for calves because they are social creatures. In pairs and groups, calves learn to play well with others, both literally and figuratively. In the literal sense, calves play more when housed with companions because of the social contact and access to more space. Figuratively, social contact early in life helps calves learn to interact appropriately with each other, and their learning ability is improved. Calves raised with companions also show greater adaptability to change. They are more willing to try new feeds such as grain, hay, and TMR. This translates into better resilience to stress and less bellowing during weaning. When moved into larger groups after weaning, calves previously housed in pairs or groups start eating sooner and do not show the growth slump often seen in individually raised calves.

Grain Intake and Growth: Several studies have shown calves raised in pairs or small groups consume grain and grow as well or better than individually housed calves. Table 1 summarizes studies comparing individually housed calves to those housed in groups of two to eight. The table shows the number of studies which found pair- or group-housed calves measured ahead of (+) or similar to (=) individually housed calves. To date, no study has detected reduced (-) growth or feed intake in pairs or small groups compared to calves housed individually. Growth advantages are especially apparent when group-housed calves are fed greater milk or replacer allowances (such as 8 quarts per day or more at the peak).

The scale of these benefits was as follows:

- **Grain intake:** greater by ¼ to 1 pound per day before weaning and by ¾ to 2½ pounds per day after weaning
- **Average daily gain:** greater by ¼ pound per day
- **Body weight at weaning:** greater by 5 to 9 pounds

Eating grain is critical for rumen development and a successful transition through weaning. Better early-life growth also means earlier onset of puberty and higher milk production.

Consumer Acceptance: In a recent study, over 1,300 adults were surveyed at the Minnesota State Fair. Nearly all of these fair goers were consumers of dairy products. Participants were shown photos of dairy calves in individual, pair, or small-group pens in a barn. They were asked to rate how acceptable they found each calf housing system. Approximately half of the participants disapproved of individual housing. Only 14% disapproved of pair housing, and only 7% disapproved of group housing. In contrast, two thirds of participants approved of pair housing and three quarters approved of group pens. Only a third thought individual housing was acceptable. For each housing system, roughly 20% of participants expressed no opinion. This is the first study evaluating consumer perceptions of calf housing. The researchers concluded social housing may be important for continued consumer acceptance of dairy production.

Table 1. *Studies[1] comparing growth or grain intake of individually vs. pair- or group-housed calves*

Measure	+	=	–
Dry matter intake of grain	11	8	0
Average daily gain of bodyweight	6	7	0
Bodyweight at weaning	8	4	0

[1]Adapted from Costa et al., 2016, plus seven studies published from 2016-2022.

Calf Health: In general, having sick calves reflects problems in colostrum management, hygiene and sanitation practices, nutrition, housing strategies, or preventive care and monitoring. Research outcomes so far are mixed regarding the impact of social housing on calf health. Although some farms manage large groups successfully, the most consistent research finding is that large group size generally affects calf health negatively compared to smaller groups. Two studies however have found less diarrhea in group-housed calves than individually raised calves. For respiratory disease, some studies report worse outcomes in groups, whereas others found similar health status between individually or group-housed calves. To date, no studies have detected significantly better respiratory health outcomes for pair- or group-housed calves compared to those housed individually. Individual housing may mask the impact of less-than ideal management on calf health by limiting disease transmission — much like a long-term quarantine. To avoid an increase in disease when moving to group housing, it is important to get the management ducks in a row beforehand. Because it can be harder to notice sick calves in a group setting, calves may already be sicker and less responsive to treatment when first discovered. These bottlenecks are manageable and should not discourage producers from considering social housing. With planning focused on raising calves in pairs or small groups, farms can reap the benefits of social housing and promote healthy calves. The second part of this guide, Benchmarks for calf health before pair housing, covers transfer of

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("Why all the fuss about pair housing?" Continued from page 4)

passive immunity, mortality, and morbidity. Measuring these outcomes will help determine if the time is right for pair or group housing. The third part of this guide, Hygiene practices, covers best practices for biosecurity, sanitation, and bedding. Limiting the spread of disease between different pairs or groups remains a best practice. The principles are similar whether managing individuals, pairs, or groups.

Housing Options: Social housing can be done in many ways. Calves can be housed in a barn or outdoors in hutches or super hutches. The fourth part of this series, Options for housing pairs or groups, describes various practices producers currently use to house calves in social groups. We also discuss the latest recommendations on space allowance. The fifth part of this series, Grouping strategies, covers group size, age range within a group, and strategies for pen and barn moves. These are also important management aspects for ensuring good calf health.

Managing Undesirable Behaviors: Some producers are concerned social housing gives calves the opportunity to cross suck on each other. Excessive cross sucking is thought to lead to frostbitten ears, navel infections, mastitis, or udder damage. The little research on this topic has not found a consistent relationship between cross sucking and those negative outcomes. Nonetheless, there are strategies to reduce this abnormal behavior. The sixth part of this series, Feeding practices and reducing cross sucking, covers research on milk allowance, feeding methods, and weaning strategies to reduce unwanted behaviors like cross sucking, pen sucking, and milk stealing.

Disbudding: Finally, the seventh part of this series, Disbudding and dehorning considerations, presents the latest standards of care for disbudding, including considerations for pair- or group -housed calves.

If you are interested in learning more about pair housing, please go to https://animalwelfare.cals.wisc.edu/calf_pairing/ to check the full series.

We are also happy to share that Dr. Jennifer Van Os will be interviewed in our podcast Cornell Cow Convos **on December 18th to talk about this topic.**

If you would like to have questions answered by her on the podcast, please fill out this survey or email Camila at cd546@cornell.edu with any questions you have.

SAVE THE DATE!

Hands-on Animal Care Dairy Training Program

Cornell Cooperative Extension and Cornell PRO-DAIRY are excited to offer a sponsorship opportunity for our upcoming Hands-On Animal Care Dairy Training Program. This one-day program will be offered in four different regions across the state, in up to 8 separate locations on different dates. Topics covered will include stockmanship, calf care, non-ambulatory animals, euthanasia, and fitness for transport.

Completion of the course will count as annually required continuing education credits for the FARM Animal Care Program. This program will include presentations and hands-on demonstrations on farm, and it will be offered in both English and Spanish.

Program Information: Hands-On Animal Care Dairy Training

March 13 & 14, 2024, 10:00am-3:00pm EST
(4 regions across NYS, up to 8 locations TBA)

Topics: • Calf care • Heifer stockmanship • Non-ambulatory cow care • Euthanasia • Fitness for transport • National Dairy FARM Animal Care Program updates

Presenters:
Dr. Rob Lynch, Cornell PRO-DAIRY & CCE Dairy Specialists

Farm Participants Needed for Bale Grazing Grant!

Information on the Project:

⇒ ***Approximately 10 acres total needed to bale graze two different bale densities***

⇒ ***"Core" farms will graze two winters, "Demo" farms will graze one winter***

⇒ ***Payments for both "Core" farms and "Demo" farms!***

⇒ ***Baseline soil sampling by bale grazing team***

⇒ ***Forage measurements in early season by bale grazing team***

⇒ ***Late season clipping if residual not trampled down by farm***

Interested farms can enroll for this winter or next. Looking for 2-3 dairy farms to enroll! **If interested**, please reach out to **Betsy Hicks**, 607.391.2673 or bjh246@cornell.edu

Management of Nitrogen Fertilizer to Reduce Nitrous Oxide(N_2O) Emissions from Field Crops

By Neville Millar, Julie E. Doll and G. Philip Robertson W.K. Kellogg Biological Station, Michigan State University Dept. of Plant, Soil and Microbial Sciences, Michigan State University

Published from: Climate Change and Agriculture Fact Sheet Series—MSU Extension Bulletin E3152

Improving the management of nitrogen fertilizer for field crops can improve nitrogen use efficiency (saving farmers money) and reduce nitrous oxide emissions (helping the climate).

What is nitrous oxide and why is it important?

Nitrous oxide (N_2O) is an important greenhouse gas that contributes to climate change. Because it has a long atmospheric lifetime (over 100 years) and is about 300 times better at trapping heat than is carbon dioxide[1], even small emissions of N_2O affect the climate.

Nitrous oxide is produced by microbes in almost all soils. In agriculture, N_2O is emitted mainly from fertilized soils and animal wastes—wherever nitrogen (N) is readily available. In the United States, agriculture accounts for approximately 8 percent of all greenhouse gas emissions but contributes about 75 percent of all N2O emissions linked to human activity[2]. Of the three major greenhouse gases emitted naturally—carbon dioxide, methane and N_2O—N_2O is the most important in all field crops but rice[3].

Automated greenhouse gas sampling chambers in a wheat field on the KBS Long-term Ecological Research site. These chambers measure nitrous oxide, carbon dioxide and methane emissions multiple times every day throughout the year, allowing researchers to accurately estimate greenhouse gas emissions. *Photo: J.E.Doll, Michigan State University.*

This fact sheet explains how better management of N fertilizer can reduce N_2O emissions from crop fields.

How does nitrogen fertilizer increase nitrous oxide emissions?

Farmers add new N to fields either as synthetic fertilizers such as urea or anhydrous ammonia, or as organic fertilizers such as manure. Most synthetic fertilizer N is readily available for uptake by plants; most of the N in organic fertilizer must be converted to inorganic N before its N is available for uptake. When not taken up by plants, most fertilizer N is mobile, hard to contain in the field and susceptible to loss. Nitrogen from fertilizer can be lost as nitrate to groundwater or as the gases N2O, dinitrogen (N2) or ammonia. Typically only about half of the fertilizer N applied to a crop is taken up by the crop during that growing season[4] (Figure 1).

Nitrogen applied in excess of crop needs is particularly susceptible to loss. Though the amounts of carbon and oxygen available in soil also affect microbial N_2O production, the presence of inorganic N usually matters most.

How can nitrogen fertilizer management decrease nitrous oxide emissions?

Because of the strong link between inorganic N in the soil and N_2O production, some emissions are unavoidable. But management that prevents the buildup of inorganic N reduces N_2O emissions. Numerous management strategies can keep soil N in check and minimize N_2O emissions[5]. Many of these strategies also help to keep other forms of N from being lost, including nitrate and ammonia. In general, practices that reduce N_2O emissions increase N use efficiency (NUE), which keeps more of the added N in the crop.

The four main management factors that help reduce N_2O emissions from applied N fertilizer are commonly known as the 4R's:

- Right N application rate;
- Right formulation (fertilizer type);
- Right timing of application; and,
- Right placement.

Matching nitrogen fertilizer application rate to crop requirement

Nitrogen availability — the amount of inorganic N in soil at any given time — is the single best predictor of N_2O fluxes in cropped ecosystems[7,8]. Michigan State University researchers have shown that N_2O emissions are especially high when N fertilizer is applied at rates greater than crop need. The emission rate grows exponentially with increases in fertilizer rate (see Figure 2), so at higher rates of fertilizer application N_2O emissions increase disproportionately, particularly after crop N demands are met[9].

Recent fertilizer recommendations for Michigan corn crops provide farmers an improved capacity to predict crop N needs[10]. These recommendations are based on dozens of field fertilizer response trials that define the *maximum return to N rate* (MRTN), which is the rate at which adding any additional N is not repaid by higher yields. This rate is typically a bit lower than the *agronomically optimum N rate* (AONR: the maximum level to which crops respond) by a margin that depends on the price of fertilizer vs. the price of grain[11]. Typically, using the MRTN approach rather than the older yield-goal approach allows farmers to realize N fertilizer savings. Because both N_2O emissions[12] and nitrate leaching[13] increase exponentially when N fertilizer exceeds crop N demand, these N savings also can result in substantially lower losses of N_2O and nitrate.

Better estimating the amount of fertilizer N needed by a crop

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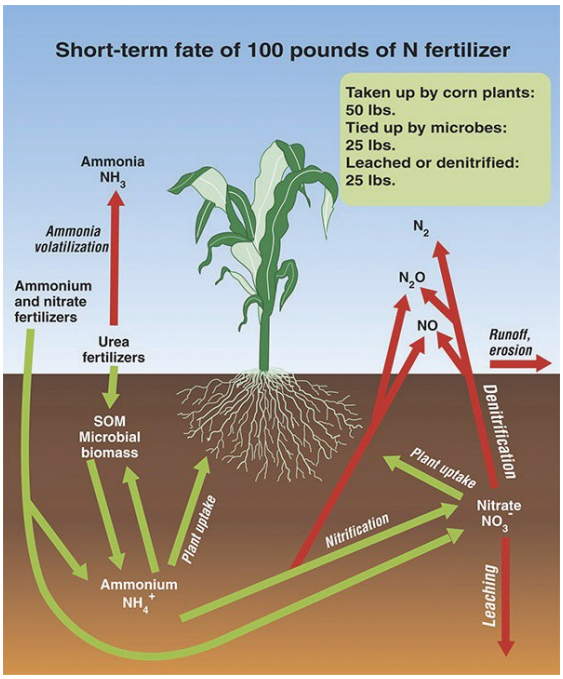


Figure 1: This simplified nitrogen (N) cycle shows the typical fate of 100 pounds of N fertilizer applied to a corn field. The exact amounts vary with soil type, weather and crop. (Source: *Ecologically Based Farming Systems*, 2007[4].)

is an effective way to reduce N_2O emitted from cropped fields.

Improving nitrogen fertilizer formulation

Fertilizer formulations also can alter N_2O emissions in some cropping systems. For example, in corn-soybean rotations, emissions can be two to four times greater following anhydrous ammonia than following urea ammonium nitrate or broadcast urea[14]. The trend toward using more urea in corn in the United States may help reduce N_2O emissions.

Fertilizer additives can also reduce N_2O emissions. Nitrification inhibitors such as nitrapyrin[15], which delay the microbial transformation of soil ammonium to nitrate, can delay the formation of nitrate until closer to the time that plants can use it. Likewise, urease inhibitors can delay urea fertilizer's dissolving in soil water. Slow-release formulations such as polymer coatings can have the same effect. For example, in irrigated no-till corn, N_2O emissions can be reduced by using polymer-coated urea or a combined nitrification and urease inhibitor with urea ammonium nitrate, compared with using either urea or urea ammonium nitrate alone[16]. As yet, however, there have been too few field studies to fully judge the benefit of additives or fertilizer formulations for N_2O emissions.

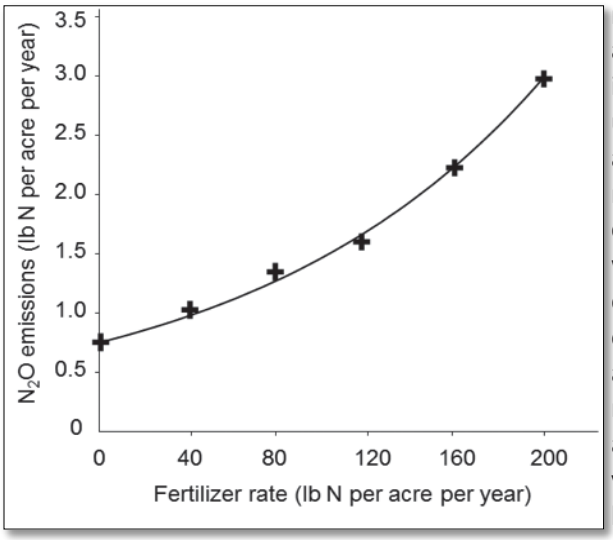


Figure 2: Data from Michigan corn fields[17] showing how nitrous oxide (N_2O) emissions increase exponentially with increasing fertilizer N rate. By more precisely estimating crop fertilizer N needs, farmers can greatly reduce N_2O emissions from their fields.

Improving nitrogen fertilizer timing

Applying N fertilizer when it is most needed by plants can also help reduce N_2O emissions. Applying the majority of fertilizer a few weeks after planting rather than at or before planting increases the likelihood that the N will end up in the crop rather than be lost to groundwater or the atmosphere. Sidedressing N fertilizer at the V-6 stage in corn, for example, can increase N use efficiency[17]— especially if application is preceded by a pre-sidedress-nitrate test (PSNT) to allow residual N to be taken into account[18].

Adding N fertilizer in the fall or spreading manure on frozen fields often leads to especially large nitrate[19] and N_2O[20] losses. In such cases, fertilizer applications are way out of sync with the timing of crop needs.

Improving nitrogen fertilizer placement

Placing N fertilizer close to plant roots also can reduce N_2O emissions. For example, applying urea in narrow bands next to the plants rather than broadcasting across the field can reduce N_2O emissions. Likewise, emissions are lower when canola and wheat are side-banded rather than banded midrow[21]. In corn, shallow rather than deep placement of ammonium nitrate or anhydrous ammonia has led to reduced N_2O emissions[22].

Precision fertilizer application can also improve NUE by tailoring N application to soil spatial variability. Adding less N to those parts of a field with low yield potential, as measured by yield monitoring, will avoid wasting N on locations in the field that are not as likely to respond to N fertilizer. In one study, precision fertilizer application reduced the average N fertilizer rate by 22 lb N per acre (25 kg N per hectare)[23], substantially reducing N_2O emissions.

Aerial view of the KBS Long-term Ecological Research experiment showing corn's response to varying levels of nitrogen fertilizer rates.

How can we best reduce nitrous oxide emissions from field crop agriculture?

An integrated approach is best suited to reduce N_2O emissions from field crop agriculture. The same principles of N fertilizer best management practices for increased NUE hold true for reducing emissions:

- Apply fertilizer at the economically optimum rate;

Cropping Notes: Weather Challenges

By Janice Degni, Regional Field Crop Specialist

What will the New Year bring? One thing we can count on are unknowns in the coming growing season. What do farmer's check every day, especially during the growing season? Most certainly, the weather report and outlook for the coming week.

Weather trumps all during the growing season causing twists and turns to many key decisions. Is it too early to plant? Is the ground too wet to travel? Will my herbicides be activated or washed off. Will my crop reach maturity? Will I be able to harvest the quality that I planned for, as a few examples.

Since the turn of the century (2000), we've adopted many new crop technologies including GMO plants with built in pest control traits and crop plants that tolerant of herbicides, making pest control easier, almost a no- brainer. That reprieve is mostly over. Unfortunately, the technology couldn't overcome evolutionary processes. Insects and weeds have adapted through many generations to overcome by developing resistance. Resistance management and practices to stave off the development or more resistance should be at the top of the priority list of management considerations. Crop and product rotation across seasons and fields is one of the first steps to consider.

I was looking through some old files recently and came across characterizations of **s**ome particularly challenging years with extreme weather. The year 2011 featured a wide range of extremes. Spring got off to a late start with late snow and cold temperatures persisting into April. The week of April 17, which was Easter week, was marked by snow flurries and nasty weather.

Climate data from the Ithaca weather station measured 7.41 inches of rain in April, 4.12 inches above normal. May was also wet with 6.2"- 2.95" above normal. June was slightly below normal with 2.59" precip (which is 1.28" less than normal), and July became droughty with nearly 3 weeks without rain. We started the season with flooded fields in the spring and several stages of planting causing uneven corn maturity. In mid-summer we had severe crop stress from drought. We had localized tornadoes and earthquakes in our region. The season's grand finale featured severe flooding in late August after a week of heavy rain from Hurricane Irene, followed by the drenching Tropical Storm Lee one week later. The Whitney Point Reservoir bridge was under water early in the storm. Binghamton and Owego suffered severe flooding.

We experienced a different set of challenges in 2012. Spring broke early in mid-March and there was no holding the troops back. Plowing got off to a record early start as well as planting new seedings. Unfortunately, by mid-April we had a cold snap and alfalfa that had grown aggressively up to 8 inches at that time was buried in snow. Some new seedings, were heavily thinned and established plants suffered from chilling damage. Both first and second cutting yields were light. Armyworm caught us off guard feeding heavily on some corn and hay fields. Potato leaf hopper took a toll on alfalfa yield and quality. Below average hay crop yields created a forage shortage for some farms. Around Aug. 8, heavy downpours caused flash flooding notably at the Cortland Walmart and surrounding properties and in Ithaca.

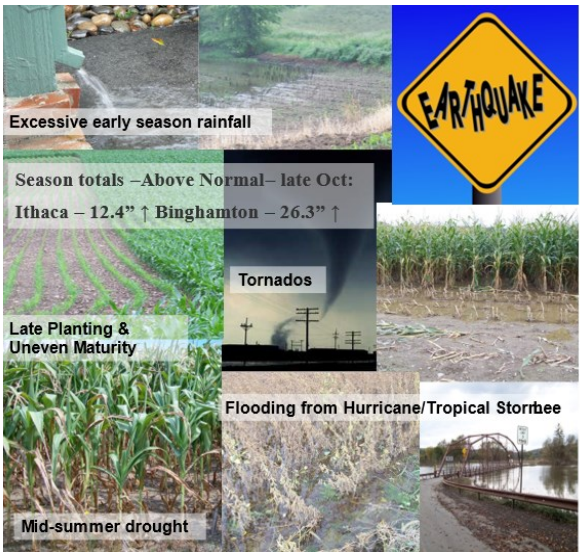
In recent years, we have had hail damage crops at early and late timings. We've had strong winds that have flattened corn fields. We've had heavy rain that damaged fields and local roads with severe washing and scouring by moving trees and stone.

When our crop's yield and quality are affected by severe weather problem solving comes into play. How do we fill our storages? Are there crops nearby to purchase? What are the options for forage extenders?

If we choose to be proactive and try to head off some of the potential problems or damage one thing to consider are options for protecting fields from erosion after the crop is removed. Cover crops are well accepted for that role. There are many more practices that can help adapt our crop systems and practices to protect and reduce the risks from extreme weather.

I'm including the following quote in the spirit of being forewarned, can lead to being forearmed.

"In the next few decades, longer growing seasons and rising carbon dioxide levels will increase yields of some crops, though those benefits will be progressively offset by extreme weather events. Though adaptation options can reduce some of the detrimental effects, in the long term, the combined stresses associated with climate change are expected to decrease agricultural productivity." (Source: "Midwest Technical Input Report." from Climate Change Impacts in the United States – US Global Change Research Program.)



The good news is that USDA public agencies have identified adaptation and mitigation practices to deal with severe weather as a high priority and there is public money available through FSA, NRCS and your local SWCD. You can learn much more about funding opportunities at the Winter Crop Meeting in January.

If you are interested in learning more about extreme weather and its impact on NE agriculture, consider joining our Dairy Climate Adaptation Fellowship. See details on page 9.

USDA Northeast Climate Hub
U.S. DEPARTMENT OF AGRICULTURE

Cornell University

CLIMATE ADAPTATION FELLOWSHIP

Dairy Climate Adaptation Fellowship

The USDA Northeast Climate Hub, in collaboration with Cornell University is offering a cohort-based learning and training opportunity for dairy producers, Extension educators, agriculture consultants, and other agricultural advisors who are interested in climate change adaptation and mitigation.

This program is for **dairy producers** in New York, Vermont, or Maine who are interested in learning more about current and future climate impacts on their farm, and are motivated to develop a climate adaptation and/or mitigation plan for their operation.

This program is also for **agricultural advisors** in those same states who work with dairy farmers and are interested in strengthening their abilities to provide climate-focused support.

Program Goals

- Provide relevant, regionally specific, climate change information to dairy farmers and advisors
- Empower farmers and agricultural advisors to become climate leaders in their communities through peer-to-peer learning
- Create opportunities for farmers to generate farm-specific climate adaptation and mitigation plans with the support of an advisor and team of Cooperative Extension dairy specialists
- Enable agricultural advisors to strengthen their climate adaptation and mitigation planning knowledge and abilities through hands-on work with farmers

What Will Fellows Do?

- Work in farmer/agricultural advisor pairs throughout the year long fellowship program beginning January 2024
- Participate in online climate training and gain access to resources from subject matter experts
- Develop a farm-specific climate adaptation and/or mitigation plan
- Share their climate change farm plan with other producers through outreach materials
- Engage with other producers and agricultural advisors at field days, farm tours, peer-to-peer network meetings, or other relevant workshops

Program Logistics

Each program includes about 16 hours of presentations and discussion at the beginning of the program, work in pairs afterwards, and a concluding workshop. The independent work (over the course of a year) can be as little or as much as the Fellows wish, as long as required activities are completed. Farmer fellows can expect to be compensated $800 upon completion of the program.

Deadline To Apply is Dec 31; Visit www.adaptationfellows.net/apply

For More Info: Contact Janice at jgd3@cornell.edu / 604-391-2672

("Management of Nitrogen Fertilizer … " Continued from page 7)

- Use an appropriate fertilizer formulation;
- Apply as close to the time of crop need as possible; and,
- Apply as close to the crop's root zone as possible.

Following these practices will, in general, result in more N in the crop and less lost to the environment. These and further potential N_2O mitigation strategies for croplands are summarized in Table 1[24].

Earning Carbon Credits for Nitrous Oxide Reductions

As previously mentioned, even small amounts of N_2O in the atmosphere can greatly affect the climate. Because of this, there is great interest in reducing emissions of N_2O from various economic sectors, including field crop agriculture. By using the N management practices described in this bulletin, farmers can reduce N_2O emissions from their fields without reducing crop yield or economic return. This is the basis for programs offered through carbon credit organizations in the United States that use the marketplace to pay farmers for these reductions.

Most straightforward and accessible programs use a methodology that estimates N_2O emissions reductions on the basis of the reduction of N fertilizer rate. This methodology is based on data collected on commercial Michigan farms[25,26] and was developed primarily by Michigan State University scientists. It allows farmers to convert their N_2O emissions reductions to equivalent units of carbon dioxide. These can then be traded as carbon credits on environmental markets to generate income (http://www.deltanitrogen.org/).

Reductions in N fertilizer input without crop yield loss can best be achieved through the use of an integrated approach that uses corn and fertilizer prices to estimate recommended N rates, and improves management of the formulation, timing and placement of N fertilizer. These changes in management practice, in combination with programs that pay for the environmental benefits they deliver, help to ensure the long-term sustainability of field crop agriculture, N use, and a stable climate. [Article references available at: https://www.canr.msu.edu/uploads/resources/pdfs/] management_of_nitrogen_fertiler_(e3152).pdf

Table 1. Proposed and potential nitrous oxide (N_2O) mitigation technologies and practices for croplands. Adapted from Cavigelli et al., 2012[24].

Technology or Management Practice	Effectiveness and Comments
Right N fertilizer application rate (applied at the economically optimum rate): N fertilizer refers to both synthetic and organic fertilizers (such as manure).	May reduce N_2O emissions substantially where N fertilizer is applied at rates greater than the economic optimum rate.
Right N fertilizer source: N fertilizer sources include urea, anhydrous ammonia, urea ammonium nitrate, ammonium nitrate and manure; slow-release fertilizers, such as polycoated urea, are not widely used because of increased costs.	Urea, urea ammonium nitrate and polycoated ureas can decrease N_2O emissions by 50 percent or more compared with anhydrous ammonia in some locations, but there is no impact in other locations.
Right N fertilizer placement: N fertilizer may be broadcast or applied in bands, applied on the surface or below the surface.	Incorporating bands of N in soil can improve nutrient use efficiency and can reduce N_2O emissions by about 50 percent compared with broadcast application in some locations.
Right N fertilizer timing: N fertilizer should be applied as close as possible to when the crop needs it.	Applying N at planting or at times of peak crop N demand can increase nutrient use efficiency and would be expected to decrease N_2O emissions, but results from field studies are mixed.
N process (nitrification and urease) inhibitors	Can decrease N_2O emissions by 50 percent in dry climates, but results are mixed for humid climates.
Cover crops	Winter cover crops can reduce N losses (for example, leaching and runoff), but may not affect N_2O emissions.
Crop selection	Low N-demanding crops can reduce N_2O emissions by more than 50 percent in many places.
Improved irrigation management: timing, application rate and application method	Reducing application rates to minimize soil wetness can reduce N_2O emissions. Subsurface drip irrigation can reduce N_2O emissions compared with overhead sprinkler irrigation because soil moisture is better regulated, but data are limited.
Reduced tillage	A long-term no-till strategy can reduce N_2O emissions by up to 50 percent, but data are limited. Short-term no-till results are more mixed.

Notes: The effectiveness of many mitigation options is influenced by soil type and climate, and there are major uncertainties about the effectiveness of most mitigation strategies.

Planting Green 101: Penn State Research Summary

Penn State Research; reprinted from https://extension.psu.edu/planting-green-101-penn-state-research-summary

Integrating no-till and cover crops requires informed management

The benefits of no-till have been well established, including reduced fuel consumption, reduced soil erosion, improved soil physical properties and soil quality, and improved water quality. We also know that some benefits of no-till are enhanced by planting cover crops, which provide additional benefits associated with living cover and roots such as weed suppression; beneficial arthropod habitat; increased soil organic matter, biological activity and structure; and nitrogen provision (legumes) or sequestration (non-legumes). However, integrating no-till + cover crops can complicate management, especially in the mid-Atlantic and northern Corn Belt. Both practices cool soil (this effect is even stronger when no-till and cover crops are used together), shortening the growing season for summer annual crops, as farmers wait longer in the spring for soil to warm up and dry out. Problems with stand establishment can then result from cooler, wetter soils, and interference from cover crop residue. Slugs, molluscan pests that eat crop seeds and defoliate young plants, are another common challenge associated with no-till and cover crops. Because they prefer moist and cool habitats, they thrive in systems without tillage that can bury eggs and warm-up and dry out soil. Recent research has also demonstrated that insecticide use can exacerbate slug populations. Neonicotinoid seed treatments are ubiquitous on corn and soybean and are used to control some secondary, early season insect pests. However, these insecticides provide no protection from slugs, but can injure or kill predatory insects when they feed on slugs exposed to the insecticide. Other pre-emptive insecticide applications, like pyrethroid sprays close to planting, can also reduce predatory insect activity. As a result, these pre-emptive insecticides practices can indirectly increase slug damage to crops because they limit the activity of predators of slugs.

What is planting green, and why do people do it?

Planting green refers to planting cash crops into living cover crops instead of the more common practice of planting into desiccated cover crops killed with an herbicide a week or more beforehand (Figure 1). Some farmers in Pennsylvania report that they "plant green" (or "grow green") to extend the soil conservation and soil health benefits of cover crops while mitigating the challenges of wet soil and slug damage associated with pairing cover crops with no-till. Planting green had not been extensively studied nor these claims quantified. So, at Penn State University we conducted a three-year study at five different locations in central and southeastern Pennsylvania to evaluate the effects on corn and soybean performance of "planting green" compared to preplant cover crop termination. In summary, over 14 site-years we measured no yield difference between soybeans planted green compared to soybeans planted into preplant-killed rye or triticale. In contrast, for more than half of our 12 site-years, grain yield of corn planted green was significantly lower or trended lower than corn planted into preplant-killed cover crops. *To read the rest of the article, use this link: https://extension.psu.edu/planting-green-101-penn-state-research-summary*

Figure 1. Cereal rye cover crop that was killed with glyphosate 3 weeks prior (left) and that will be killed after soybean planting (right) at Rock Springs.

Attention Dairy Producers and Beef Farmers in NYS, and those advisors who work with them!

Your insight is requested to help maintain the viability of the Beef x Dairy Industry in New York State. Take our new survey here: https://cornell.ca1.qualtrics.com/jfe/form/SV_5yxP0IqJPncmb78

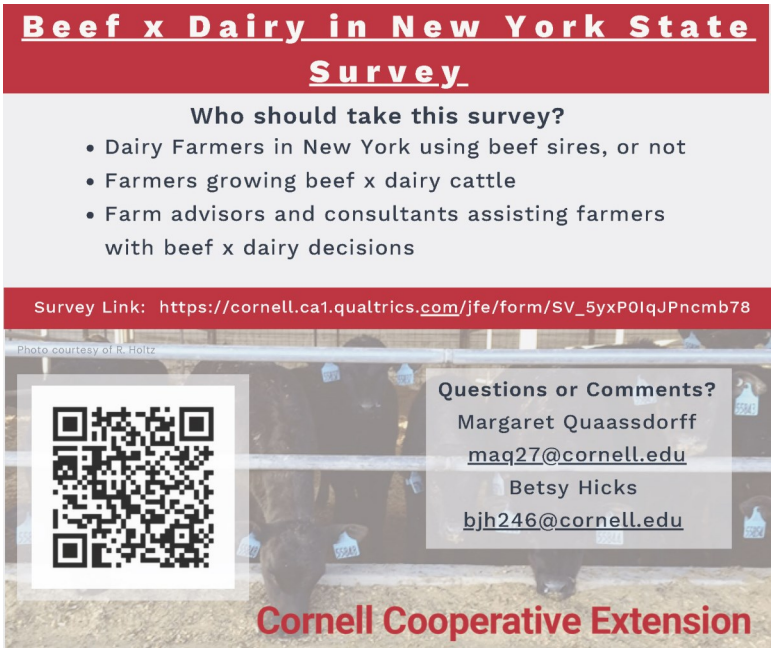
A lot has changed in the beef x dairy industry in NYS since our last survey in 2021. Your responses to this survey will help Cornell Cooperative Extension Regional Dairy Specialists, Margaret Quaassdorff and Betsy Hicks to better understand the management practices of, and resources needed by NY farmers in this growing market.

Who should take this survey?

- **Dairy Farmers in New York using (and not using) beef sires in their dairy herd**
- **Farmers purchasing and growing beef x dairy cattle**
- **Farm advisors and consultants assisting farmers with beef x dairy cattle decisions**

Survey link: https://cornell.ca1.qualtrics.com/jfe/form/SV_5yxP0IqJPncmb78

For questions, or a paper copy of the survey, please contact Margaret Quaassdorff (maq27@cornell.edu); 585-405-2567 or Betsy Hicks (bjh246@cornell.edu); 607-391-2673
Regional Dairy Specialists w/ Cornell Cooperative Extension.



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Upcoming Events Calendar

Tuesdays, Jan 8—March 12 12—1pm	Whole-Farm Efficiency Webinar Series To register: https://cals.cornell.edu/whole-farm-efficiency-webinar-series
January 18th January 19th 9:15 –3 pm	Winter Crop Meeting—Auburn Sennet Fire Dept Winter Crop Meeting—Dryden VFW To register: https://scnydfc.cce.cornell.edu/events.php
January 19th	2024 Agricultural and Food Business Outlook Conference
March 13 & 14	Hands-on Animal Care Dairy Training Program

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