FARM REPORT

FROM THE PRESIDENT'S DESK: STATE OF THE INSTITUTE 2018

In December I prepare a year-end report for our Institute Trustees that summarizes the accomplishments of our programs and staff. Each year as I write this report I'm amazed at what our modest-sized staff of about 55 people is able to accomplish in research, education, and demonstration. As readers of our *Farm Report*, I wanted to share some of the highlights with you.

Education Programs. In 2017 we had 70 students enrolled in our educational programs – that includes undergraduate, graduate students, and interns. These students participated in our Advanced Dairy Management semester, Applied Environmental Science Program, year-long internships, and Summer Experiences in farming, equine management, or agricultural research. At least half of the cows in the region are touched by a Miner Institute graduate, and we take special pride in the leadership role that our network of alumni plays.

Research Programs. In 2017 we garnered approximately $700,000 in research support through grants, facilities, and equipment. Nearly one million dollars of research grant income flowed through the budget in 2017 – an all-time high for us. We built research bunker silos, brought our nutrient management field research sites to a total of four, and enhanced our milk analysis program. While conducting the research our staff managed to make 74 presentations to various scientific and industry groups and write 67 papers. Of these, 7 were in peer-reviewed scientific journals such as the *Journal of Dairy Science*. Going forward we intend to focus on these high priority needs of the dairy industry: forages and fiber nutrition, milk analysis as a herd management tool, nutrient management with our edge-of-field research sites, and the interaction between cow management and nutrition.

Demonstration and Outreach Programs. In 2017, 3760 people came through our stone gates to attend a program or visit our Heritage Exhibit. In all, nearly 40 events were held at the Institute. Dairy Day, Crop Congress, the Dairy Nutrition Short Course, and Equi-Day focused on our industry friends while other programs engaged the community such as our Agriculture in Society speaker series or the Day of the Morgan Open House. Increasingly we have engaged with the dairy industry and the community at large to educate and advocate for agriculture.

Of course the full story for any organization lies behind the numbers, but these few metrics tell me that the Institute is on-track and that our staff does a great job. We have a lot planned for 2018 – so if you have questions about the range of Miner Institute programs – research, education,

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ARE YOU READY?

Preparedness for unforeseen emergencies on your farm

Cornell University
Cooperative Extension
Clinton County

Thursday, Jan. 18, 2018
1 - 3:30 pm

The Joseph C. Burke Education and Research Center at Miner Institute
586 Ridge Rd. Chazy, NY
FREE and open to the public!

Program features:

- Kelly Donoghue from Clinton County Emergency Management Services will offer tips for how to be prepared; what have been the difference makers on properties where emergencies were well handled; and how to train staff for emergency preparedness.
- Northern Insuring representative Tiffany Garcia will offer an overview and understanding of insurance coverage: how it works and what you need.
- Yankee Farm Credit consulant Joanna Lidback will offer expertise on estate planning so that your farm business is ready for whatever the future brings.

Did you Know?

January 2018 marks *20 years since the infamous Ice Storm of 1998!!??! If you lived through it, you undoubtedly have not forgotten it.*
The Ice Storm caused an estimated $3 billion worth of damage; millions of people lost power — some for several weeks or more; millions of acres of damaged trees; impassable roads and dozens of storm-related deaths.

For more information, please contact Rachel Dutil at Miner Institute: dutil@whminer.com or 518-846-7121, ext. 115 or Sara Bull at Cornell Cooperative Extension: slk95@cornell.edu or 518-561-7450.

HERBICIDE-RESISTANT WEEDS: AN OUNCE OF PREVENTION

A cursory review of farm magazines and agricultural e-newsletters should convince you that herbicide-resistant weeds are a Big Deal. This is a personal issue for me since about 40 years ago I was one of two Cornell University Field Crop Specialists who, in the same week in two fields about 200 miles apart, found what were the first confirmed findings of triazine-resistant weeds — in this case common lambsquarters. We harvested seeds from the lambsquarters plants and sent them to Cornell University where they grew the plants in the greenhouse. Technicians then applied about ten times the rate of atrazine as would normally be required to kill lambsquarters plants, to utterly no effect.

The Franklin County (NY) corn field where I found the triazine-resistant lambsquarters is a perfect "how to" for inducing herbicide resistance: Same crop and same herbicide or herbicide combination, year after year. When weed control begins to fail simply apply more of the same herbicide (even if the rate exceeds the maximum labeled rate). By the time I arrived there were only two plant species growing in that field: A lousy yield of corn and a great yield of lambsquarters! The lambsquarters plants had already formed seedheads so when the farmer chopped the field for silage he also harvested tens of millions of lambsquarters seeds. (This isn't an exaggeration since the average lambsquarters plant has about 70,000 seeds.) These seeds survived the ensiling process just fine, and when the silage was then fed to the farm's dairy cows the seeds also survived their digestive tract. The result is that when the farmer applied the manure to his fields he did a great (if unwitting) job of evenly distributing the weed seeds.

Lambsquarters is one of the earliest-germinating seeds so can become competitive early in the growing season. Germination is usually in soil depths of 1 inch and less, but seed dormancy means that plowing won't put an end to the problem. Lambsquarters retains about 50% germination after 10 years in the soil, and seeds on a single plant have varying dormancy requirements. That's why lambsquarters is so persistent in the soil.

At last count there were almost 250 herbicide-resistant weed species in the U.S., with one or more in every state. The problem is worse in California, Illinois and Michigan, each with at least 20 herbicide-resistant weed species. The best way to control herbicide-resistant weeds is to prevent them in the first place. Farmers in this region have a slight advantage since some of the worst herbicide-resistant weeds aren't serious problems here — yet. Some of the worst ones including Palmer amaranth, waterhemp and marestail are more prevalent in the Midwest. The worst of these is Palmer amaranth, which a recent survey of weed scientists across the U.S. topped the list of "most troublesome" weeds (although lambsquarters was rated as the most common herbicide-resistant weed). Originally a problem mostly in the Southern U.S., Palmer amaranth has spread to the upper Midwest. Many fields where the weed was found had received applications of manure from dairy cows that were fed cotton byproducts including cottonseed.

A few suggestions to prevent (or at least delay) herbicide resistance on your farm:

1. Rotate crop species, and rotate herbicides within a single crop species that's grown for several years in the same field. Rotate not just herbicides but herbicide families. For instance, triazine-resistant lambsquarters is resistant to atrazine and to other triazines herbicides as well. If necessary get the assistance of your local Extension educator or commercial Certified Pesticide Applicator.
2. Inspect fields early in the growing season, soon after herbicide application. It's important to detect weed escapes early because it's almost always easier to kill a weed when it's still in the seedling stage.
3. Try to prevent weed escapes from going to seed. If there are only a few — or a few hundred — suspicious-looking weeds in a field consider hand-pulling them before they set seed. Farmers with school-age kids might consider setting a bounty on each weed yanked out and presented to him as a "proof of purchase". Hand-pulling weeds may sound like a lot of work but it's better to contend with a hundred problem weeds in a field than a million of them. In fact I did this one year with some jimsonweed (a poisonous weed) that we found growing in one of our fields at Miner Institute.
4. Be careful as to what you bring onto the farm so that you don't borrow weed problems from another region. That's one reason why you should buy clean seed (including winter cereals for cover crops) instead of cheaper "bin-run" seed. Years ago a USDA crop disaster program provided farmers in the affected parts of this region with bin-run oats that were of unknown origin. I looked at the bottom of a grain cart after a farmer had fed out most of the oats and what remained was a layer of weed seeds of various species — thousands of them. Whether the farmer eventually fed the weed seed or dumped it into the gutter, the seeds wound up in the manure and eventually onto his fields. Some farmers probably wondered how they got those weird weeds they'd never before seen in their fields!

— *Ev Thomas*
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HIGH DIGESTIBILITY FORAGES: THE NEXT STEP

With the advent of reduced-lignin alfalfa we should be further ahead in achieving the objective of any dairy farmer worth his trace mineral salt: A cow that produces more and more milk but less and less manure and urine. Here's the plan: Farmers would feed their cows a whole lot of BMR corn silage plus just enough bud-stage reduced-lignin alfalfa silage to supply protein and promote good rumen function. Both corn silage and alfalfa silage would have been treated with inoculants promoted as increasing digestibility. The diet would be high in corn silage because research has shown that cows on an all corn silage diet make 16% less manure (and also a lot less urine) than cows on an all hay crop diet. So we start with high digestibility via the latest alfalfa and corn genetics (both reduced-lignin alfalfa and BMR corn silage are already about 85% digestible) and then we further increase the digestibility via the inoculants.

Between the high starch content of the BMR corn and the very high crude protein content of the reduced-lignin alfalfa, plus the already high digestibility of both forages further boosted by the silage inoculants, farmers should be able to feed grain "with a teaspoon", as the saying goes. Indeed, with the price of some of this ramped-up genetics the farmer's annual seed bill might exceed his feed bill! (Just kidding — I think!) As forage digestibility continues to increase, the A.I. inseminator might wind up making more use of that orifice under the cow's tail than the cow does herself.

What could possibly go wrong?

— *E.T.*

HIGH DIGESTIBILITY FORAGES: THE NEXT STEP…FORWARD….

Ah, yes, who can deny the exhilaration of driving a bus with no brakes? Imagine a barn full of happy, healthy dairy cows, rumens running on maximum fiber digestibility, minimizing fecal output and grain imports, to the point of insufficient manure and P to fertilize all the land we will need to raise that much more forage. And let's not forget the possible twists and turns of the lower intestinal tract – literally.

Increasingly higher digestibility forages sounds great in theory, but as always it's all about the application. How do we best feed highly digestible forage fiber and for what ends: optimal rumen health, maximized milk or components, minimal manure, or maximum income? Higher fiber digestibility requires higher feeding rates of fiber. We should know how to do this as we have been up this part of the learning curve before, right? BMR corn silage.

Focus on the basics of rumen function relative to fiber digestion: Increased NDF-d results in decreased rumen retention time, ↑rate of passage,↑DMI, ↓pH, ↑flow of CLA, possibly ↓milk fat. Perhaps similar to a pasture ration. Whether you prefer rumen mat, chew factor, u30 or u240, keep in mind the balance of fast to slow carbohydrate. The more fast carbohydrates (fiber, starch, sugar, NFFS) the more slow carbohydrate (fiber) is required without taking up rumen volume (straw; okay, how about sawdust…?). That ratio will vary and will depend on individual feeding systems and forages. In other words, we don't yet have hard reference values other than the u240 of 0.30 -0.40 % of BW, although with alfalfa the value may be 0.45%. Here are some thoughts on Ev's "No lignin" forage world:

1. Lock in lbs. of grain then add forage to match DMI. For example, at only 25 lbs grain it may take 35 to 55 lbs of forage DM to meet DMI levels. The ration may be upwards of 70% forage. Based on the yield of components, is this economical for you? Will it result in healthier cows?
2. What is the energy yield of higher NDFD fiber? Do cows get more VFA out of the more digestible fiber or does the remaining undigested fiber (uNDF) just get out of the rumen faster, allowing for greater DMI?
3. Make sure you have the land base to produce 20% more forage. They will likely eat that much more forage.
4. Reduced-lignin alfalfa may be best fed as dry hay rather than silage. Gains in the rate of intake and digestibility may be greater with dry hay than silage, relative to moisture content when fed. Consider the time required to ingest and hydrate the fiber of the dry versus moist ensiled fiber particle.

Don't get wooed by the latest technologies. Make sure they fit your farming system.

— *Kurt Cotanch*

MASTITIS: FROM THE 1980s TO NOW, THE BATTLE CONTINUES

The Miner Institute *Farm Report* has been around for 36 years now, so I decided to look back at the first ever one that was published. The *Farm Report* dates from January 1982 and talks about a wide range of things from rotating corn hybrids to sulfur for alfalfa. One article that caught my eye was titled, "Mastitis – The, Battle Goes On" The article was written by Dr. Harry Randy, the past Director of Research and President of Miner Institute from the 1980s until his untimely death in 1991. Dr. Randy was very involved with day-to-day management of the herd, and in the article he discussed the ongoing issue the herd faced with the presence of mastitis.

In Dr. Randy's article he described that the staph species, *Staph aureus*, and strep species were the cause of the majority of mastitis cases in the herd. Just about everything had been tried to lower the frequency of mastitis including pre- and post-dipping cows (which had been done for some time by then) and installing automatic takeoffs to try and eliminate the human error. Decisions were made to cull cows that were identified as "chronic"; selected based on average production, history of clinical mastitis, DHI somatic cell count, and bacteria culture. With these changes, the farm still didn't see much change in the number of mastitis cases. The next plan of action was to have the milkers go through eight hours of training on milking systems and mastitis. By the end of that year it was their goal to install a low line and new washing system. The costs of training and equipment were deemed worthy of the investment. The somatic cell count dropped from 250,000 to 150,000 and they were only treating 2-3 cows a month for mastitis, compared to the 28 cows that were reported at the end of August the previous year.

How far has the dairy industry come since the 1980's in mastitis control? Since 1980 the number of recorded mastitis cases in herds decreased from 37% to 20%, a large drop. Research initially focused on identifying and characterizing the causes of most mastitis, and from there developed antibiotics to help treatment and control. Further down the road antibiotic therapy, post dipping of cows, clean equipment, automatic takeoffs, vacuum fluctuations, and monitoring teat health were all strategies for controlling the spread of bacteria. Control of environmental factors such as having a dry clipped udder, cleanliness of stalls, bedding sources, and ensuring that cows eat after milking to allow time for closure of the streak canal, are all areas where recommendations have been developed over the years. Selecting genetic traits such as udder height and teat conformation have also helped cut down on the incidence of mastitis. Culling cows that are considered to be chronic is still a common practice on many farms. Vaccinations for mastitis were at one point starting to develop with researchers primarily targeting *Staphylococcus aureus*. The vaccination, however, didn't prove to be effective.

How have things changed at Miner Institute since Dr. Randy wrote that article in 1982? First of all, the herd size has nearly quadrupled. Our dairy staff has done a great job in keeping our somatic cell count relatively low, averaging 115,000 in 2017 with several months under 100,000. Generally our herd treats 8-10 cases of mastitis per month which is a similar rate to the Miner Institute herd in 1982. We still battle with most of the same organisms, however *Klebsiella* seems to be our new challenge. As Dr. Randy indicated in 1982, milker training seems to have been the best investment to keep somatic cell counts low and reduce mastitis cases. While writing this article for the *Farm Report* I couldn't help but think how far we have come with detection, treatment, and lowering the incidence of mastitis. So what does the future hold for mastitis in dairy herds across the world? Is there a future without mastitis? Maybe someone will write a follow-up article 36 years from now….stay tuned in 2054!

— *Katie McMahon*
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NOT A GREAT YEAR FOR DAIRY

Milk price forecasts for 2018 aren't so hot. Fortunately for dairy farmers, grain prices should remain fairly low: Futures prices for corn about $3.50 and soybeans $10. Even with low feed prices 2018 would be an especially good year for some belt-tightening in crop inputs. Following are a few suggestions.

- More nutrients come onto dairy farms (primarily from grain purchases) than leave it, so soil fertility on most dairy farms continues to increase. If your fertilizer program hasn't changed in several years or more this would be a good time to take a close look at your soil tests and reduce fertilizer purchases where you safely can. The place to start is phosphorus, an expensive nutrient and the one most likely to have increased. In fields where soil test P is high there's no reason to include P in starter fertilizers — plenty of NY on-farm research confirming this. ("Because I've always done it" is a reason, but not a good one.)
- Maximize the use of manure nutrients, most of which are at least as plant-available as the nutrients in commercial fertilizers. Manure won't acidify the soil as will N fertilizers, it supplies valuable secondary and minor nutrients, and contributes organic matter to the soil.
- Don't use corn hybrid traits you don't need. This includes the Roundup Ready trait in fields where you won't apply glyphosate, the corn borer trait in most situations, and the rootworm trait in 1st and 2nd year corn.
- Finally, focus on management practices that add value without adding expense: It doesn't cost any more to plant corn on May 10th than on June 10th or to mow alfalfa on May 25th vs. two weeks later. But early-planted corn will yield more while timely-harvested alfalfa can put more milk in the tank.

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THE ICE STORM OF 1998

I just threw away the "Ice Storm of 1998" commemorative T-shirt I bought 20 years ago this month since after hundreds of trips through the washer and dryer it was looking a bit tattered. (Our church sold them as a fund-raiser to assist families affected by the storm.) It reminded me of that disaster and the impact it had on the forest owned by Miner Institute and the Miner Foundation. Our forestry consultant had just marked a large block for harvest, selectively marking trees to be cut. But after the ice storm (reportedly a 500-year event) he went back in and re-marked just the trees to be left standing — and there were discouragingly few. I remember how concerned Miner Institute's Chairman of the Board Dr. Joe Burke was a month or two later when we looked at one of the just-cut areas, with so few trees remaining. But our consultant said that our forest would recover and that with proper management within 15 years it would be as productive as before the ice storm. By the fall of 1998 Joe and I took another "timber cruise" and he was amazed at how quickly the forest was recovering.

It's now 20 years later, and the "Ice Storm of '98" is mostly a memory. Our forest did recover, and selective harvest allowed the removal of damaged and low-quality trees and the growth of young, healthy ones. Where nothing was done recovery was much slower and the damage was visible for many years. But with a little assist from man, Mother Nature is a pretty neat lady.

– E.T.

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and demonstration – please feel free to contact us. And, if you find yourself in Northern New York, please stop in and experience for yourself the outstanding facilities, grounds, programs, and staff of Miner Institute.

As in past years, I close the books on 2017 with enormous satisfaction, and can't wait to get started on 2018. Happy New Year to all of you!

– Rick Grant
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ANOTHER LOOK AT CORN SILAGE HYBRID SELECTION

One of the most important decisions for a farm to make is what corn hybrid they're going to plant for silage. Luckily there is a wealth of information when making the selection. The first consideration is what are the needs of your animals and operation. From this you can estimate the amount of corn silage needed for the year. Based on your available acreage, determine which hybrids will yield enough to meet your needs. Another factor to consider is how much fiber and how digestible that fiber is. A measure of total fiber content is neutral detergent fiber (NDF) and potentially digestible NDF (pdNDF) is the measure of fiber that can be degraded. The pdNDF is calculated by subtracting undigested NDF at 240 hours from NDF. With these two fiber measures, a NDF and pdNDF yield can be calculated and considered when evaluating corn silage hybrids.

Table 1. Comparison of BMR and Non-BMR corn silages hybrids.

Trait	BM3	BM1	Non-BMR
Yield, ton/ac (35% DM)	20.5	20.9	21.0
NDF, % of DM	35.6	33.5	35.2
NDFd 30-h, %	62.3	58.7	54.0
uNDF240, % of DM	7.8	8.9	11.9
pdNDF, % of DM	27.9	24.6	23.4
NDF yield, ton/ac	7.3	7.0	7.4
pdNDF yield, ton/ac	5.7	5.1	4.9

Corn silage hybrid needs to provide the tonnage to feed cows, but also have the fiber digestibility to allow optimal milk production. Brown midrib (BMR) corn silage has a mutation (BM1 or BM3) that produces less lignin and has increased neutral detergent fiber digestibility (NDFd). Some of the hurdles for widespread adoption of BMR corn silage is the lower yield and cost of seed. A trial conducted at Miner Institute in 2016 compared BM3, BM1, and non-BMR corn silage hybrids. There were 2 BM3, 1 BM1, and 2 non-BMR corn silage hybrids that were averaged and reported in Table 1. The yield for BM3 was 1.5 tons per acre less than the non-BMR hybrids, but the BM1 was very similar to the non-BMR hybrids. The BM3 and non-BMR hybrids have similar NDF content, and the BM1 was lower than both. Both BM3 and BM1 were lower in uNDF240 than the non-BMR hybrids and the BM3 had a higher pdNDF content than both the BM1 and non-BMR hybrids. The NDF yields were similar between the hybrids with the BM1 being slightly lower. When this was expressed as pdNDF yield the BM3 was higher than both the BM1 and non-BMR hybrid, and the BM1 yielding more than the non-BMR hybrid also. This is in line with the NDFd at 30 hours with the BM3 being the most digestible followed by BM1 then non-BMR hybrid being lowest. High quality forages should be allocated for the highest producing cows. In a Journal of Dairy Science article, researchers at the University of Nebraska reported that high-producing dairy cows had a greater response to high quality corn silage than low-producing dairy cows. There is opportunity to grow several corn silage hybrids to match the needs of your cows. The NDF and pdNDF yields can be used as another metric for hybrid selection.

Creating a forage system that matches the needs of your farm is vital for long term success. Corn silage is a major component of a dairy cow's diet and little changes in digestibility can influence intake and lactation performance. Using pdNDF yield will help evaluate the corn silage hybrid that provides the most degradable fiber, but should be used in conjunction with yields of dry matter and NDF.

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Is there something you would like to know more about?

Send Farm Report article suggestions to Rachel at dutil@whminer.com

THE UPS AND DOWNS OF FERTILIZING GRASS

Soil fertility research is time-consuming and expensive. I know this first-hand because long, long ago (1970s) and far, far away (actually a farm in Peru, NY) I assisted in a Cornell University field trial designed to determine P and K rates for corn. Sixty plots — a lot of work! Someone must pay for this research, and with declining public funding of Land Grant Colleges this work is getting harder to do.

Grass — at least in the Northeastern U.S. — has long been forage crop's poor relative. It's not nearly as exciting as corn or alfalfa, and the major seed companies mostly ignore it. Fertilizer recommendations for grass have changed little over the years, and this is particularly true for potassium recommendations.

Based on research at Miner Institute plus years of experience growing and fertilizing grasses, I believe that most soil test-based potassium recommendations for established grasses are too high. Here's my case:

1. In 1994 we leased 20 acres that had been in continuous grass with no fertilization for at least 10 years. Soil test K was extremely low, just what we wanted since we leased the land just to do potassium fertilization research. We seeded three grass species in replicated plots, and the year after establishment we applied three rates of potassium: The Cornell University soil test-based recommendation of 80 lbs K_2O/A, two higher rates and a zero-K control. (Nitrogen was applied to all plots.) Over two years we got almost no yield response from K, in no case enough to pay for the fertilizer. But even in the control plots (no K application) forage K averaged 2.5% K which is normal for grass.
2. In spring 2007 following several years of corn we seeded a leased field to alfalfa + reed canarygrass, getting excellent establishment of both. But over the winter almost all the alfalfa died while the grass came through just fine. Trying to determine what went wrong, in summer 2008 we sent a soil sample to the Cornell University soil test lab. That soil sample tested zero lbs. of potassium while a forage analysis on third cut grass harvested just a week before that soil sample was taken had 2.65% K!

Quirine Ketterings and her team at Cornell University conducted K rate studies for alfalfa at the Musgrave Research Farm in Aurora, NY between 2007 and 2010 and continued with on-farm K rate trials with alfalfa and alfalfa/grass mixtures in 2009-2010 involving collaborators across the state. At Aurora, with an initial soil test K (STK) of 117 lbs K/acre on the Cornell Morgan test (classified as high in STK for a calcareous Kendaia/Lima soil), K fertilization increased yields only in 2008, an exceptionally good growing season with average yields of 6-7 tons DM/acre, considerably above the average yield potential for that soil type. That year a K rate of 252 or 355 lbs. K_2O/acre delivered a significantly higher yield (0.4-0.7 tons/acre) than the no-K control. For each of the other years (2007, 2009 and 2010), K addition did not impact yield. The plots didn't have a manure history – corn in the previous years had received fertilizer only. Averaged over the five years of alfalfa, annual yield was 3.7 to 4.0 tons/acre, consistent with the yield potential for the soil type, *with no net gain in yield with K addition over the four years in the study.* Thus, the optimum K rate across all five years was 0 lbs K_2O/acre, a little less than the 20 lbs K_2O/acre Cornell recommendation for a Kendaia/Lima soil with a high STP. Surprisingly, not even the highest K additions were able to increase tissue K beyond 2%, suggesting that current critical values for tissue K for alfalfa need to be re-evaluated.

The on-farm trials with alfalfa and grass mixtures, including manured sites, confirmed recommendations for K for alfalfa based on the Cornell Morgan soil test but only when the percent alfalfa in the stand was 50% or higher. *For fields with more grass than alfalfa, there was no correlation between yield response to K and soil test K level.* Trials on N and K fertilization of reed canarygrass by Jerry Cherney at Cornell University showed that reed canarygrass responded to low available K levels in the soil by producing more roots near the soil surface.

Based on this information I believe that most soil test-based fertilizer recommendations for grass for New York soils overestimate K needs. The root systems of grasses are so efficient at using limited amounts of potassium that they can thrive while other crops suffer (or in the case of alfalfa, die). *This is why I recommend that farmers NOT seed alfalfa-grass unless soil test K is high.* Topdressing potash after seeding won't work because the grass will intercept the fertilizer. (Don't ask how I know this.) The efficiency of nutrient uptake of grasses is *extremely* high — two trials at Miner Institute found 75% uptake efficiency of applied N and almost 100% uptake efficiency of chloride. A Minnesota trial applied 40,000 gallons/acre of liquid manure (not a typo) to established reed canarygrass. But when they tested nitrate concentration at 20" soil depth there wasn't any more nitrate than from a 100 lb fertilizer N application. (First cut yield where manure was applied was over 5 tons DM/acre of 20% CP grass.)

Regardless of your soil analysis, if you're growing straight grass I don't think you need to use any potassium fertilizer. Any manure you apply during the spring or summer to supply N will supply more than enough K — enough P as well. However, regardless of the crop you're growing it's not a good idea to let soil test K levels get too low.

Finally, thanks to Quirine Ketterings, Jerry Cherney and Karl Czymmek who reviewed and made valuable contributions to this article.

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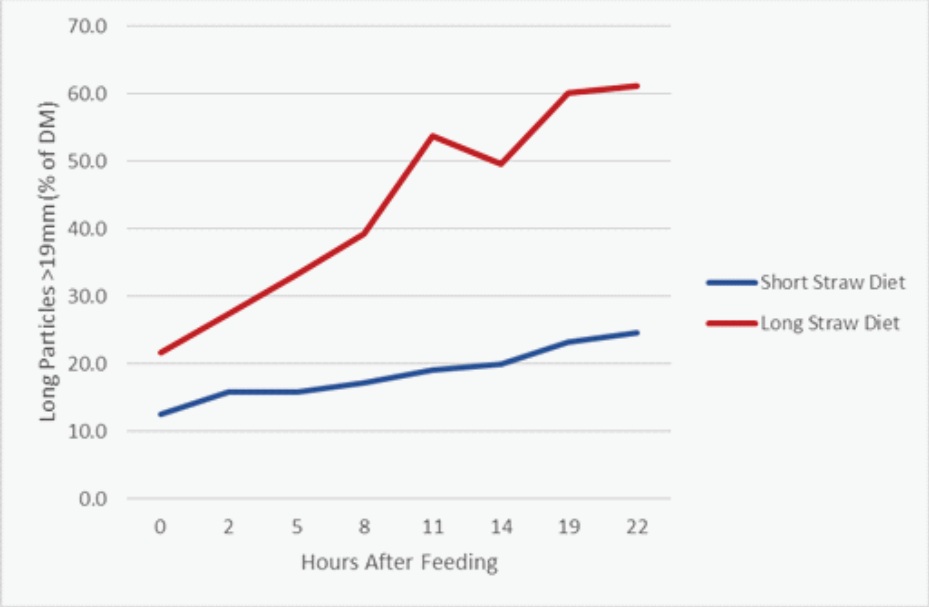
PARTICLE SIZE AND STOCKING DENSITY: CAN HEIFERS BE AFFECTED TOO?

Until the onset of her first lactation a dairy heifer doesn't make any money for the farmer; in fact, she costs a considerable amount of money. A recent report by Penn State Extension estimates that a heifer costs $1.17 per day from 6 months of age until breeding and $2.02 per day from breeding until she is in her prefresh stage. A lower age at first calving results in higher milk yield and profit. A combination of correct feeding and management techniques is necessary to achieve the goal of 82% of a heifer's mature body weight at the time of calving at a lower age. Research by Coblentz et al. (2017) at the University of Wisconsin evaluated the effects of straw processing and pen stocking density on sorting behaviors of the diets offered and growth performance of Holstein heifers. The study looked at short straw versus long straw inclusion in otherwise identical diets fed to heifers stocked in densities of 100, 125, or 150%. This research is similar to what has been done here at Miner Institute with lactating cows.

Heifers fed the short straw diet and housed at 125% and 150% stocking density had a reduced total weight gain and average daily gain compared to heifers fed the same short straw diet but housed at 100% stocking density. There was no difference observed between the two overstocked pens (125 and 150%). Since there was no difference in dry matter intakes between stocking densities for the short straw treatment, the reduced weight gain can be explained by a reduced feed efficiency in the overstocked pens. Unlike the short straw diet, there were no differences in any measurement of growth or feed efficiency between heifers in the 100% stocking density pen compared to heifers in the overstocked pens for the long straw diet.



Proportion of the TMR made up of short (<19 mm) and long particles (>19mm) throughout the day.

Using a Penn State Particle Separator, Coblentz was able to determine sorting behaviors by sampling the refusals at the bunk at time points throughout the day and comparing the particle size fractions to those of the TMR that was initially fed. Although both the heifers fed the short straw TMR and the heifers fed the long straw TMR sorted against long particles (>19mm) and in favor of medium, short, and fine particles (<19mm), more aggressive sorting was exhibited by heifers on the long straw treatment (as seen in the figure). There was no difference in sorting behaviors between stocking densities, however the sorting behavior potentially becomes more detrimental in overstocked conditions. Social tension between dominant and subordinate heifers is exacerbated when feed bunk space is limited, which would lead subordinate heifers being forced to wait until the more dominant heifers are done before they can eat. Not only does this mean the subordinate heifers are spending more time standing idly while they wait for their turn to eat, but when they finally are allowed to eat they're presented with feed that was already sorted, leading to different nutrient intakes than the TMR was formulated to supply. Understandably this would lead to a greater variation in growth rates within the pen.

As with lactating cows, heifers experience stressors and have a limited ability to cope before performance (i.e. growth rates) becomes impaired. Therefore, we must pay attention to the management of our heifers as we would our lactating cows. Feeding high quality forages that don't encourage sorting and keeping pens at an appropriate stocking density are among the management practices that will help maximize growth performance and lead to an earlier age at first calving and a more productive dairy cow.

— Ashley Cate
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THE REALITY PEOPLE ACCEPT (*Editorial comment)*

In an old *Calvin & Hobbes* comic strip Hobbes chides Calvin about whether his homework assignment is optional. After Hobbes notes that "Denial springs eternal", Calvin replies: "It's not denial; I'm just very selective about the reality I accept." I'm often reminded of this — *the reality people choose to accept* — in talking with our neighbors in and around Oak Point. The Oak Point community is mostly college-educated — doctors, lawyers, college professors, etc. — and retired. Most are prosperous since otherwise few could afford to buy and pay the taxes on their St. Lawrence River-front property unless they inherited it as we did. (Our property, formerly a dairy farm, has been in the family for over 150 years.)

But just because our neighbors are college-educated doesn't mean they know much about how their food was produced, in fact probably little more than the average American consumer. Last summer one of our Oak Point friends visited a small organic dairy farm and came back extolling the virtues of organic farming (which is fine) but demeaning the practices used in conventional dairying (which is not fine at all). I pointed out the errors of her more outrageous statements but was not sure I made any headway. Damian Mason, an Indiana farmer, noted that "Only 1% of Americans are farmers. And 85% of America is so far removed from farming they do not understand what we do *even when we tell them.*" (The italics are his.) That's why the farming community should support efforts to educate the public: It may not seem like it does much good since there are so many of them and so few of us, but it's worth the effort.

— *Ev Thomas*
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WHAT STINKS?

Iowa State University is using a 50-year old Japanese discovery in an attempt to reduce manure odors. Researchers at the University of Tokyo found that when assisted by ultraviolet light, titanium dioxide could reduce objectionable odors by breaking down smelly organic compounds into carbon dioxide and water. Last summer this was tried on an Iowa hog farm. Manure odors were reduced by 16% when the air in the barn was drawn through a black-lit tunnel coated with titanium dioxide. This may not sound like much but the improvement was noticeable — the nose knows — and the results were somewhat more promising during the winter. The next step would be to increase the system's size since the tunnel used in the Iowa trial was only 1' x 8'. Painting the inside of a barn with titanium dioxide would cost about the same as regular paint, and black lights aren't expensive. Ultraviolet light-emitting diodes are cheaper still, and might also do the job. What isn't yet known is what dairy cows would think of UV and black lights… *Source: The Economist, 11/11/2017, p. 72.*

— *E.T.*

FIRST HARRY A. RANDY EDUCATION FUND PRIZE AWARDED

Through funds available from the Harry Randy Education Fund at Miner Institute, we awarded our first prize to an attendee of our recent Dairy Day event on Dec. 7. This fund was established in 1991 after Harry's unexpected death during his tenure as President and Director of Research at Miner Institute. Harry's passion was dairy cows and working with dairy producers. In an effort to both honor Harry and support Miner Institute's mission, we decided to annually award a Dairy Day attendee with a spot on the trip to the western United States with our Advanced Dairy Management students. This year's winner is Michael Duncan of Ormstown, Quebec.

Michael will travel with our students and some staff to visit dairy farms in the Central Valley of California, tour San Francisco, and spend a couple days at the World Ag Expo in Tulare, CA. The World Ag Expo covers more than 2.6 million square feet and hosts more than 1,400 exhibits and attracts 120,000 people. Each year the trip provides an incredible educational opportunity for our students. Students enjoy having producers join them on the trip and it benefits both the producer and the students in a variety of ways.

We are looking forward to our annual field trip and plan to award the next trip at 2018 Dairy Day (not yet scheduled).

CROP CONGRESS AT MINER INSTITUTE
Wednesday, Jan. 31
10 am - 3 pm

AGENDA:

10 a.m. Dr. Eric Young, Miner Institute: *Update on Tile Drainage Research*

11 a.m. Joe Lawrence, Dairy Forage Systems Specialist for PRO-DAIRY: *Corn Traits, Pest Management, and Corn Silage Hybrid Trial Update*

12 p.m. Hot Lunch available for $5.

12:45 p.m. Kelsey O'Shea, CCE North Country Regional Ag Team: *Crop Insurance Options*

1 p.m. Dr. Gary Bergstrom, Cornell University: *Overview and Update on Field Crop Diseases*

2 p.m. Dr. Rick Grant, Miner Institute: *Feeding Corn Silage to Lactating Dairy Cows*

3 p.m. Adjourn

The meeting will be held in the auditorium of the Joseph C. Burke Education and Research Center at Miner Institute, 586 Ridge Rd. in Chazy, NY.

- Admission is FREE and the meeting is open to the public.
- Pesticide applicator credits will be available.
- Crop Congress is organized in collaboration with Cornell Cooperative Extension.
- Pre-registration is encouraged.
- For more information contact: Wanda Emerich, 518-846-7121 x117 or Emerich@whminer.com

Miner Institute is located in Chazy, NY on Miner Farm Road, Route 191- 1 mile west of Interstate 87, exit 41. Travel time is approximately 1 hour south of Montreal, 20 minutes north of Plattsburgh, NY, 1.5 hours from Burlington, VT, or 3 hours north of Albany, NY.

The William H. Miner Agricultural Research Institute
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Chazy, NY 12921

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Closing Comment

Women like silent men; they think they're listening.

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