

# FARM REPORT



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## FROM THE PRESIDENT'S DESK: HITTING THE SWEET SPOT

Pastures contain much more sugar than common diets based on fermented forages. Consequently, there has been growing interest in the effect of added sugar to diets based primarily on silages that predominate in the U.S. dairy industry. Much, but not all, of the research to date has shown that adding sugar to the diet will enhance feed intake and milk yield. Until recently, the fairest conclusion would be that sugars tend to increase dry matter intake and milk fat specifically, but energy-corrected milk response to added sugar may be variable. In short, finding the sweet spot in dietary sugar content has been elusive.

In an effort to sort through the previously published research and reach some consistent and useful

conclusions, a paper published in 2017 combed the literature on added sugars and cow response (de Ondarza et al., 2017. Prof. Anim. Sci. 33:700-707). These researchers compiled data from 24 papers published between 1995 and 2014 with dietary forage NDF varying between 14.6 and 38.5% of dietary dry matter. In fact, they summarized data from all of the papers I referenced in the opening paragraph of this article. In these papers the source of sugar ranged from molasses, commercial liquid supplements, whey, or dry sugar – either sucrose or lactose.

In their analysis, the authors evaluated the following categories of added sugar:

See **SUGARS**, Page 9

## AND TO ALL A GOOD NIGHT...

It's really hard to believe that nearly a year has gone by since I arrived at Miner Institute last December to begin my internship. Never could I have imagined that in the course of a year, I would feel so seamlessly interwoven into the fabric of a place and a community that has felt more like home than anywhere I've been before. Never could I have imagined that I would be happier over the course of 11 months than I'd been in 11 years. As one of my friends put it, "You've been looking for Chazy since I've known you." Looking back at the experiences I've been able to have, the people I've met, and the skills I've learned since then, I'm so glad that what started out as a late-night, frustrated job search in the summer of 2018 became a reality. I'll be sticking around for a while longer, so fear not, dear reader, the bad puns and catchy titles will live on.

See 'Twas the Night, Page 2

# 'TWAS THE NIGHT ... (Miner Edition)

I leave you this year with my rendition of “The Night Before Christmas”, in the Miner spirit.

Wishing you and your families a very happy holiday season,  
filled with laughter, love and memories with the ones you hold dear.



‘Twas the night before Christmas, and on Miner Farm Road  
New barn rafters rose high above fields laid with snow  
The farm staff were nestled all snug in their beds  
Knowing cows, calves and horses were comfortable, warm and fed  
A light from the Farm Office cast a warm, sauterne glow  
As a single figure sat at a desk, gazing out the frosted window  
His farm report needing that beguiling, lyrical slant  
It would be, of course, from the desk of Rick Grant.  
“What to my readers can I say to end the year?”  
He asked, tapping a pen on the arm of his chair  
When what to his wondering eyes should appear,  
But the ghost of William Miner, his voice jovial and clear.  
“Fear not, Dr. Grant, I bring you no harm  
But good tidings of cheer to all of you at the farm!  
Agriculture needs you, if not now more than ever  
For farmers everywhere benefit from your research endeavors.”  
“You’re right”, Rick said, “but there’s been such a blight  
Of negativity and bad information, against which we must fight.  
How do I reach them? How do I keep leading the charge?  
When it seems that the naysayers loom ever so large?”  
“Just remember my words”, Miner said with a wink  
“If you put them to use, it’s easier than you think.”  
‘Do what is right, for it’s the right thing to do’  
So keep up the good work, your mission here is true.”  
When then from downstairs there arose such a clatter  
He found naught but a note and some cookies on a platter  
“These are for Santa” it read, “I know, what a classic!  
And this milk? You wouldn’t BELIEVE the de novo fatty acids”  
When he returned upstairs, he found the ghost gone  
But Miner’s wise words in his mind lingered on  
Rick finished his report, but not a minute too soon  
For E.T. had already hinted it was well past overdue.  
May the good tidings of Christmas surround you and yours  
And in the New Year, our good faith and work to endure  
With a gentle reminder to always do what is right  
Merry Christmas to all, and to all a good night.



– Cari Reynolds  
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# WHAT SHOULD HEIFERS GAIN PER DAY?

The end goal of replacement heifer programs is to have animals that enter the milking herd. We want them to be healthy, appropriately sized, and raised in an economical way for the farm. Ultimately, we want an animal that has good lactation potential. Part of addressing those goals is to benchmark where we want or should be and determine where we actually are right now. So how do we determine what the optimal growth for the replacement heifers is to ensure that we have an economical rearing system that supports optimal lactation performance?

Pat Hoffman, long-time University of Wisconsin-Madison dairy extension specialist, detailed some of the main points about determining total growth of replacement heifers in a chapter he wrote that focused on dairy heifers in the e-book *Large Dairy Herd Management* 3rd ed. He noted that to reach the goals of the heifer program above we need to pair management with nutrition. Before targeting the nutrition program to meet the requirements of those growing animals, each farm should have an idea of what the optimal growth target is for those replacement animals between birth and entering the milking herd and in how much time they have to achieve this. Only after this has been determined can we fine-tune the nutritional strategies to reach those goals.

Total growth is the amount of growth required between the time when the calf is born to right before it first enters the lactating herd. There are two things that influence the total growth required of a replacement dairy heifer: 1) number of days on feed and 2) the genetically appropriate body weight before calving. These factors determine the overall average daily gain that

should be targeted for the entire heifer replacement program. Average daily gain required is calculated with  $[(\text{precalving body weight} - \text{birth body weight}) / \text{days on feed}]$  and is the overall ADG from birth to precalving.

Days on feed will be in part determined by the target age at first calving. However, the heifer reproductive efficiency will greatly influence actual days on feed and could increase the variability between animals as they calve in. To optimize first-lactation milk yield the ideal age for Holstein heifers to calve is between 22 and 24 months of age. If a farm has different age at first calving targets, different average daily gains will be required. Optimum economic age at first calving for dairy heifers is between 22 and 24 months of age which means days on feed should be between 670 and 730. For example, if you have a calf that is 88 lbs and target either an age at first calving of 22 or 24 months and the target weight for that animal before calving is 1400 lbs. then the heifer planned to calve at 22 months will need to gain 2.0 lbs. per day while the heifer planned to calve at 24 months will need to gain 1.9 lb/d.

In reality, not every heifer in the herd calves in at the same age and spends the same days on feed. The range often observed on farms is where heifer reproductive efficiency comes into play. The range on days on feed might vary based on inconsistent breeding criteria and the efficiency in which heifers get pregnant. When we have a range in age at first calving from 21 to 27 months of age the target average daily gain required for those animals becomes very different. For the same calf, at 21 months would be required to gain 2.1 lbs. while the heifer calving in at 27 months would only be required

to gain 1.6 lbs. per day. This makes feeding those heifers for those specific average daily gains very difficult without getting over conditioned heifers if there is a large range of days on feed within a pen. To help control the number of days on feed Hoffman recommends setting a defined target age at first calving, setting a min and max AI service age, setting a min body weight to breed and consider culling if not met, using an efficient breeding protocol, and also limiting number of services.

The second piece of determining average daily gain required is target body weight before calving. This can be determined based on the mature body weight of the herd, which is the average body weight of the third-lactation cows in the herd. The precalving target as a percentage of mature body weight should be 94%.

With these metrics and goals in mind, I would encourage each farm to evaluate their heifer program so that they know what their target average daily gain should be precalving. There will be variability in the expected average daily gains through different portions of the heifer rearing program but determining overall average daily gain required will provide a benchmark to evaluate the replacement program. With this information I would encourage you to think about the things that are going well and question if there is something that might improve the efficiency in which you are raising your heifers. As we fine-tune the age at first calving and the reproductive efficiency, we can formulate diets to meet the requirements of those heifers for optimal average daily gain and heifer performance.

— Sarah Morrison  
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# WINTER AND WET WEATHER MANURE APPLICATIONS

For the second year in a row, farms in our region are facing extremely challenging weather as they attempt to free up enough manure storage space for the winter. After a very wet spring that forced many to plant much later than usual, the delayed harvest was almost immediately followed by wet weather, flooding, and finally, almost a foot of snow in many areas. I've discussed in previous articles the factors that make manure applications in the nongrowing season particularly risky with respect to nutrient loss. However, given the predicament many find themselves in, I wanted to highlight some ways to manage the risk of nutrient loss and avoid water quality violations.

Before getting to the guidelines, a quick reminder of some of the regulatory framework. New York State CAFOs must obtain a State Pollutant Discharge Elimination System (SPDES) general permit under the Clean Water Act or the Environmental Conservation Law. The language in the permits is the same with regard to winter and wet weather manure applications. First and foremost, it's important to recognize that these permits prohibit the application of manure on saturated (frozen or liquid) ground at any time.

Both permits have a section specifically to address "Winter Weather Applications". They define winter spreading conditions as periods when the "soil is frozen (4"+), snow covered (4"+), or encumbered by significant surface icing." Every farm's nutrient management plan should have a winter spreading plan, which should include fields that have been identified as low risk for winter weather applications as well as practices that will reduce the

risk of offsite transport (e.g., manure injection, extended buffers).

Additionally, both permits require farms to utilize the "Revised winter and wet weather manure spreading guidelines to reduce water contamination risk", developed in 2015 by Cornell University. The following list covers some of the most important takeaways from the guidelines, but please note that it is incomplete, and I encourage folks to take some time to review the complete set of guidelines, which can be found at: <http://nmsp.cals.cornell.edu/publications/files/WinterSpreadingGuidelines2015.pdf>

- 1. Soil Moisture Status:** Avoid poorly-drained fields as these are likely to be the first to generate runoff when snowmelt occurs. Also, consider the amount of water that will be added to the soil with liquid manure applications (10,000 gal/ac = ~0.4" water) to avoid saturating the field.
- 2. Snow, Ice, and Frozen Soil:** Fields that were well-drained prior to frost allows for manure to infiltrate the soil. In contrast, spreading on frozen-saturated soils is prohibited because soil that froze when the soil was saturated will have an impenetrable "concrete frost" barrier that prevents manure infiltration and is therefore highly likely to be lost in runoff. When only a thin surface layer of ice has formed, it can be broken up with tillage equipment to expose the soil beneath.
- 3. Ground Cover:** Cover crops, crop residue, and vegetated buffers can help reduce the risk of runoff by intercepting rainfall, promoting infiltration, slowing the velocity of runoff, and filtering runoff water. Target fields with these attributes as long as they don't

have other risk factors addressed in these guidelines.

- 4. Slope and Slope Length:** Applications made at the top of a long slope tend to be less risky than those made at the top of a short slope. The base of concave slopes where water often emerges due to an elevated water table, or slopes with low permeability/shallow bedrock, are high risk areas and should be avoided.
- 5. Drain tile, surface inlets, ditches, concentrated flows/draws:** These features in fields increase the risk of nutrient loss because of their ability to increase drainage from the field. Observing mandated setbacks is essential, but voluntarily increasing the setback distance from these higher risk areas can provide an additional safety net. Fields with preferential flow pathways (higher clay content) and tile drainage should also be managed with caution as there is greater connection between the field surface and the tile drains. Monitoring tile outlets is advised and contamination will often be evident within a short period of time if runoff is occurring and tile outlets are flowing.
- 6. Nearby surface water:** Avoid fields with a slope such that surface runoff is likely to flow directly to a stream or waterbody.
- 7. Nearby wells or karst features:** Avoid spreading in areas nearby wells or karst features, and inject or incorporate manure in fields that are in any proximity to these features.
- 8. Likelihood of Precipitation:** Pay attention to 48-hour weather forecasts. Precipitation greater

See **MANURE**, Page 5



# IMPORTANCE OF THE CHEW

As you are eating a meal, do you stop to think about what you're doing as you eat your food? Most likely not, as it is done subconsciously and during the process of mastication or more commonly called chewing. Through the process of chewing you are reducing the particle size of the food and coating it with saliva. This helps to increase surface area and allow safe, pain-free passage through the esophagus. Cows do this same procedure, but it can have bigger implications in rumen function and health. The saliva from a cow contains buffer in the form of bicarbonate. The cow is also unique from humans as they ruminate or regurgitate and re-chew their food; this process also provides saliva. Since saliva provides buffer, more saliva whether through chewing or rumination will help to raise rumen pH and provide a more stable environment.

The cow will produce saliva from chewing and ruminating, but also will swallow saliva during resting. In a *Journal of Dairy Science* article researchers at the University of Saskatchewan reported that lactating dairy cows on average produce 63 gallons of saliva per day. They also found that 50% of the saliva was produced during rumination, 23% during chewing, and 28% during resting. So rumination is an important behavior, not only to provide saliva with buffer but also to reduce the particle size of the ingested feed. To ensure adequate rumination it's vital to provide enough fiber in the diet. Since cows prefer to ruminate while lying down it's important to provide comfortable bedding and limited competition for stall space.

To achieve high milk production, it's not only what we provide in the diet but the environment the cow lives in to maximize her natural behaviors. Cows have the drive to lie down and ruminate, which helps to reduce particle size and buffer the rumen. This helps to prevent an abnormal rumen fermentation. Remember to provide comfortable bedding and an opportunity to use it. So next time you take a bite, think about how your cows are eating and ruminating and whether their environment optimizes their natural behavior.

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# MANURE, Continued from Page 4

than 0.5 inches is likely to generate some runoff from most fields, and applications should be avoided when greater than 1 inch of rain is forecasted.

- 9. Snowmelt Conditions:** Temperatures of 40°F for 6 hours or more is likely to generate runoff from snowmelt. Manure applications should always be avoided when a warm front is projected in the next few days.
- 10. Manure Consistency:** All forms of manure are at risk for loss in runoff, but liquid manure with less than 5% solids is at particular risk, especially on tile-drained fields. Consider additional BMPs to reduce this risk.
- 11. Method of Application:** Manure injection or incorporation will reduce the risk of loss in runoff.
- 12. Application Rate and Total Spreading Volume:** Split applications reduce the risk of loss and reduced rates should also be considered.

Many of these strategies should already be outlined in the farm's nutrient management plan. The weather is not making things easy out there, but reviewing and following your winter and wet weather plans and talking through any questions with your planner is the best bet to keep farm operations running and your local water clean.

— Laura Klaiber  
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# NNY CROP CONGRESS MEETINGS

Crop Congress is offered in collaboration with Cornell Cooperative Extension North Country Regional Ag Team.

- **Crop Congress in Canton, NY**  
Tuesday, Jan. 21, 2020 at the Best Western
- **Crop Congress in Chazy, NY**  
Wednesday, Jan. 22, 2020 at Miner Institute

\* NYS DEC Pesticide Applicator Recertification Credits will be available.

More event details coming soon!



Cornell Cooperative Extension  
North Country Regional Ag Team

## MARK YOUR CALENDARS! MINER INSTITUTE IS HAVING AN OPEN HOUSE SATURDAY, AUG. 8, 2020



free, family-friendly event

- displays and games
  - wagon rides
- equine demonstrations
- learn about a modern dairy farm



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# WINTRY THOUGHTS

The Bride and I have made our annual move to winter quarters just south of Richmond, Virginia in what may seem like a half-hearted attempt to escape the ravages of winter. It ain't Florida, but in December the average low of 32°F down here is about the same as the average high at Oak Point. A few thoughts as we head into winter:

- Proximity to a large body of water can make a big difference in the date of the first killing frost. We have a waterfront home, and the St. Lawrence River acts as a “heat sink” during the fall as it slowly releases the warmth of the summer. We head for Virginia soon after Election Day, and as we leave we often have roses still in bloom. But as little as one mile inland, corn was frost-killed by mid-October.
- By now your 2019 crop corn silage should be about right to feed, assuming that it's been ensiled for at least two months. If you're still feeding 2018 corn silage don't be in a hurry to start feeding the new crop because starch digestibility will continue to increase, though at a slower rate than during the first two months. Some dairy nutritionists recommend at least three months, but the longer you wait the more inventory of old crop corn silage you need.
- Hopefully you sampled your corn as it was being ensiled so you should have a fair idea of feed value. Those numbers aren't good enough for ration balancing — expect NDF to be a bit higher than at ensiling due to fermentation losses — but it

should prevent any nasty surprises.

- If you haven't ordered seed corn for 2020 it's time to do so. The seed situation isn't terrible but following a very wet 2019 growing season in the northern half of the U.S. — including in some seed corn production areas — this would be an especially good year to order your seed corn early. The wet conditions resulted in a lot of Corn Belt farmers exchanging their full-season hybrids for earlier ones, so the carryover inventory of hybrids suitable for the Northeastern U.S. may be unusually low. (For further discussion read the “Seed Orders” article below.)

— *Ev Thomas*  
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## SEED ORDERS

December is prime time for seed orders, particularly corn hybrids. One way to reduce your seed cost is via early order/early pay discounts. Early order discounts are a no-brainer since it doesn't involve writing a check, but the discount for early pay is often enough to make it economical to write that check. (This discussion ignores the income tax consequences, but you shouldn't.)

What about volume discounts? Not only do seed dealers want you to order seed from them, but they'd like you to order a lot of it, encouraging you to do so by volume discounts. The amount of this discount depends on the size of your order and differs among seed companies. However, getting significant volume discounts is tough if you buy from every seed dealer who darkens your door. For most farmers it's prudent to buy seed from

more than one seed company, especially if you buy specialty hybrids such as BMR. And it's definitely not a good idea to plant all one hybrid (unless you plant only one field of corn). But limiting the number of seed companies you do business with can reduce the net price you pay without reducing yield potential, and with today's dairy economics (improving but still far from good) every dollar counts.

— *E.T.*

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## NOBODY ASKED MY OPINION, BUT...

... my wife asked me if I knew what today is. Men are so easy to scare.

... I'd read that wives speak twice as many words each day as their husbands do. When I informed The Bride of this, she said that's because husbands don't listen so their wives have to repeat everything. To which I replied: “What?”

... proving how gullible some folks are, an increasing number of pet food companies sell non-GMO dog and cat food, also non-GMO birdseed. The average life expectancy of songbirds is about two years, and dogs are so discerning in their diet that they'll happily snack on “cat box crunchies”. Heaven forbid that Fido, Fluffy and Tweety would be offered food containing genetically modified grains.

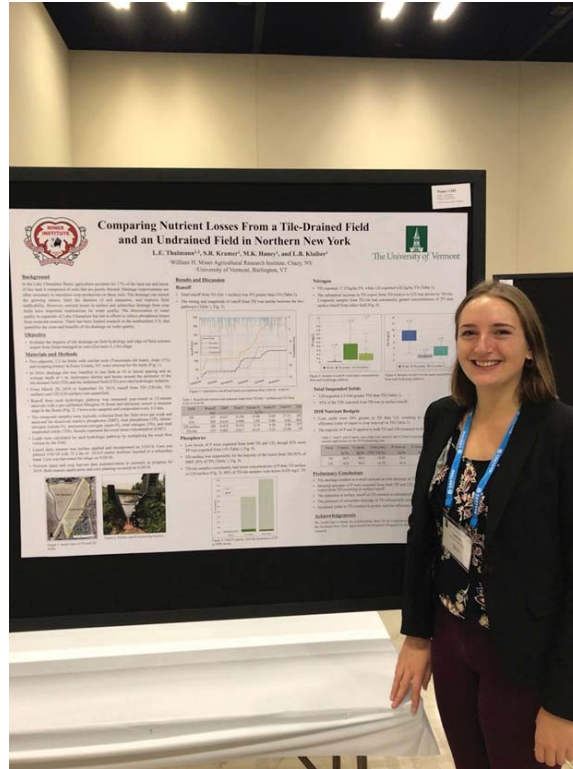
— *E.T.*



# RESEARCH MAKES AN IMPACT

It is hard to believe I'm starting my final year as a graduate student at Miner Institute through the University of Vermont for my master's degree in soil science. It feels like yesterday I was at home sitting around the dinner table with my family, but in reality it's closing in on six years. Growing up in Patchogue, an up-and-coming suburban town on Long Island, I never had the opportunity to visit a dairy farm. Since starting here, the hands on learning experiences have taught me so much about life on a farm and in the research field.

My academic journey started at the State University of New York at Plattsburgh, where I was undecided in my future plans and flipped around from nursing to business administration before deciding on environmental science. I was very active on campus as the president of the Botany Club. Academically, I was engaged and excelled, adding on a second major in geology. The world out-of-doors excited me, and I took multiple internships. I monitored shorebirds with Suffolk County Parks and at Brookhaven National Lab I trapped white-footed mice. After I graduated, I worked for the U.S. Forest Service in Southeast Alaska assisting with the salmon subsistence fishery's program. My time in Alaska was nothing short of amazing and I would love to return and work there! After my time with the Forest Service I moved back to New York and started my assistantship at



Miner Institute. At this point I've finished all required course work and am focusing on my research comparing the effectiveness of tile drainage soil management practice on surface and subsurface water quality between a tile-drained field and an undrained field.

This past week Mark Haney, a research technician, Laura Klaiber, the nutrient management research scientist, and I had the opportunity to go to San Antonio, Texas for the American Society of Agronomy, the Crop Science Society of America, and the Soil Science Society of America annual meetings with nearly 4,000 other scientists, professionals, educators, and students. Throughout the conference, scientific presentations and

discussions ranged from fire-impacted soils to edge-of-field monitoring. During the week, Mark, Laura, and I gave poster presentations where research information is shared using a poster that conference participants may view and discuss with the presenter over two hours. My poster outlined research results for my master's thesis during the Soil & Water Management & Conservation (SWMC) graduate student division. Throughout the session, my research generated an abundance of interest and questions. Afterward, I felt revitalized when I realized the positive impact and importance Miner Institute's research has in the environmental field. The icing on the cake was placing first for the SWMC graduate student poster presentation section.

Looking towards the future, I plan on finishing up my program at Miner Institute in September 2020, and use my degrees and skills attained to continue working in the environmental water quality field. As I continue collecting data and writing my thesis, you'll undoubtedly be hearing more about the environmental research we conduct at Miner Institute to better understand the impact of tile drainage on nutrient balance in the Lake Champlain Basin.

— Leanna Thalmann  
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# PIG TALES

In our truly global agricultural economy, a dead pig in China can move grain markets in the Corn Belt. The Chinese government claims that its farmers are getting a handle on its African swine fever epidemic, but reports coming from there as it were are somewhat more pessimistic. Some Chinese farmers have attempted to repopulate their hog operations only to have the new batch die because they didn't follow the recommended quarantine period. China has half the world's hog population, or did before losing 300 million hogs since the epidemic hit over a year ago, and pork is by far the most commonly consumed meat there.

Having spent some time on farms in back-country China I can understand the challenge. The U.S. and China have about the same area but the U.S. has twice the farmable land. China has about four times our population and over 80 times more farmers, so obviously the typical Chinese farm is much, much smaller than the average U.S. farm. There's a lack of technology and scientific know-how on many of these small farms, so it's not surprising that some of the farmers are attempting to repopulate their hog operations much sooner than they should. Swine fever will be plaguing (pardon the pun) China for a long time. It's also having a big impact on U.S. hog sales since we're shipping a record amount of pork to China with much, much higher volumes expected in 2020.

— *E.T.*

## SUGARS, Continued from Page 1

control (i.e., no added sugar), 1.5 to 3%, 3 to 5%, and 5 to 7% of dietary dry matter. For cows producing more than 73 lb/d of milk, added sugar was associated with 4.7 lb/d more 3.5% fat-corrected milk. In contrast, for cows producing less than 73 lb/d of milk, added sugar yielded only 1.7 lb/d more 3.5% fat-corrected milk.

Over all of the studies in their data base, they found that added sugar had no effect on milk fat or protein percentage. Interestingly, with these studies, the nutrient fractions that had the greatest impact on 3.5% fat-corrected milk yield were added starch and the so-called protein B2 fraction. Everyone understands what starch is, but for folks who are not regular CNCPS model users, the B2 protein fraction measures proteins with intermediate rates of rumen degradation.

The researchers' statistical analysis identified the optimal total dietary sugar content to be about 6.75% of dietary dry matter. Importantly, the optimal amount of sugar to add to a diet will be a function of dietary starch, soluble fiber, protein B2, and forage NDF. In particular, when adding sugars to the ration, we need to focus on the complementary dietary concentrations of starch and soluble fiber if our goal is to enhance 3.5% fat-corrected milk yield. Common feed sources of soluble fiber include beet pulp, citrus pulp, and alfalfa.

From these studies, the authors concluded that, when adding sugar to the diet, the optimal range for dietary starch is 22 to 27% of dietary dry matter. Similarly, the optimal range for soluble fiber is 6 to 8.5% of dietary dry matter. The production of fat-corrected milk and milk protein were highest when the diet contained approximately 5 to 7% added sugars. For most diets, this amount of added sugar would translate to about 6.75 to 8% total sugar (as a percent of dietary dry matter). For common dairy rations fed in the U.S., this level of sugar addition would mean feeding about 1.5 to 2.2 lb/cow per day of additional dietary sugar.

Increasingly, adding sugar to silage-based rations is a standard nutritional practice, and the results of this study provide highly useful information on how to best formulate diets containing added sugar. It appears that hitting the sweet spot in ration formulation requires keeping your eye not only on sugar, but starch and soluble fiber as well.

— *Rick Grant*  
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# WHAT'S HAPPENING ON THE FARM

The question for this month's article should be "What's new on the farm?" The answer to that question is Kevin Tobey, DVM, The William H. Miner Agricultural Research Institute Dairy Herd Health Manager. In late October I became the Dairy Herd Health Manager at Miner Institute. I would like to share with you my 31-year journey from Summer Equine Intern to Dairy Herd Manager. In the months to follow, this article will feature informative topics on dairy herd health management with an emphasis on prevention of disease, because as we all know one of the keys to a productive and profitable herd is a healthy herd. I will provide the most up-to-date peer reviewed research, as well as what is and is not working for us.

First, I would like to take this opportunity to thank a few people who have made this dream job a reality, and the transition from the corporate world to the day-to-day managing of a dairy herd much easier. The first group is Steve Couture, Dairy Farm Manager; Katie Ballard, Director of Research; and Wanda Emerich, Dairy Outreach Coordinator. Steve, Katie and Wanda all saw the value a veterinarian with 25 years of dairy experience could bring to both the health of the herd, and the education of the dairy employees and the students who participate in our programs. The second group is Dr. Nate Theobald, Herd Veterinarian with Palmer Veterinary Clinic; Anna Pape, previous Herd Health Manager; Victoria Vendetta, previous Assistant Herd Health Manager; and Alexandra Banks, previous Herd Health Intern. Dr. Theobald, Anna, Victoria and Alexandra have implemented several standard operating procedures and protocols which help make this dairy work seamlessly on a day to day basis. Last but not least are my wife Kathy

and my daughter Mikayla. There are a lot of long hours that come with the job so that means many hours away from home, but they see the true joy this job brings me. For that purpose alone, I thank them for their sacrifice.

As I mentioned earlier, this job was 31 years in the making. It all started the summer of 1988 when I accepted a position in the Summer Experience in Equine Management Program. Katie Ballard was the manager of the equine herd at that time. How does a Summer Experience in Equine Management lead to a Dairy Herd Health Managers position? Growing up in a small town in East Central Massachusetts my passions were basketball and horses, and my career goal was to be a highly successful equine veterinary surgeon. Although I never lost my passion for horses, when I attended the University of Maine, Orono I developed a new passion for dairy cows. I enrolled in the Summer Experience in Equine Management Program to help me make the decision of which species I was going to focus on in veterinary school. As you can see the dairy cow was the specie of choice.

Upon graduation from Purdue University College of Veterinary Medicine in 1994 I accepted a position as an Associate Veterinarian with Northwest Veterinary Associates in St. Albans, VT. I spent 13 years working there as a dairy practitioner. Working with dairy customers in Northeast NY and Northwest VT, I mastered my skills in both bovine medicine and surgery. In 2007, I left private practice to become a Technical Services Veterinarian with the Cattle Business Unit at Novartis Animal Health. I spent eight years with Novartis Animal Health, consulting and educating dairy producers and

veterinarians on cattle immunology and vaccination protocols. In 2015 Novartis Animal Health was purchased by Elanco Animal Health, and I made the transition to Elanco with the acquisition. Three years with Elanco, I continued consulting with dairy producers and veterinarians on topics such as dairy cattle reproduction, mastitis control and transition cow health. In 2017, with the reorganization of the Elanco cattle division I sought employment elsewhere, and in January of 2018 I accepted a job as Sales Territory Manager with Merck Animal Health in Eastern NY and New England.

There are four key roles which make up successful dairy herd health management team: herd health manager, herd veterinarian, herd nutritionist and external dairy industry consultant. The dairy herd health manager makes crucial decisions regarding herd health on a day to day basis. Twenty-five-years of experience as a herd veterinarian and external dairy industry consultant will go a long way in helping me make those crucial day to day decisions.

In the January issue I'll focus on key areas of mastitis control such as on-farm mastitis culturing, milking parlor evaluations, and environmental and udder hygiene. Speaking of udder hygiene, with the arrival of winter and cooler ambient temperatures, it's time to think about clipping or singeing cows' udders to remove unwanted hair, which hinders the milking crew's ability to properly sanitize the cow's udder prior to milking. Remember healthy cows are productive and profitable cows!

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# YEAR IN REVIEW? TRY SILAGE IN REVIEW

It's that time of year when we gather with our families to open elaborate packages that offer us surprise and excitement. And no, I'm not talking about Christmas presents, I'm talking about our silage bunks. As I write this we're preparing to transition to our 2019 forages. Opening our corn silage bunk sets the tone of how we're going to manage our entire nutrition program (and bottom line costs) over the next year. Although it can feel as if a million factors are at play when it comes to ensiling, the fermentation process is something that can be predicted. Reviewing the basic phases of ensiling may help us predict what we will find in our silage bunks. The ensiling process can usually be broken into four phases: 1) Aerobic respiration, 2) Fermentation, 3) Anaerobic stable phase, 4) Feed-out.

The aerobic phase begins when we start to pack the silo; removing oxygen quickly from the silage is a high priority. When silage is exposed to oxygen aerobic respiration from the plant enzymes and spoiling microorganisms converts carbohydrates to heat, water, and carbon dioxide. This may represent a huge loss of energy from the forage! The sugars that would increase milk yield are the first to disappear. This phase is where dairymen can see a large loss in dry matter (DM) and quality. Shrink due to aerobic respiration typically is between 5-15%. There's usually more DM loss due to aerobic respiration in drier forages, as they can't be packed as densely. High packing density and optimal packing and harvesting speed are the best ways to limit this shrink during respiration. Respiration will decrease forage quality as it increases neutral detergent fiber and acid detergent fiber and can decrease

overall net energy of lactation in the forages. The high pH during this phase can result in proteolysis, which is the breakdown of proteins. And as temperature rises from the heat of respiration, protein becomes "tied up" in the acid detergent fiber, becoming Acid Detergent Insoluble Nitrogen (ADIN) which is indigestible to the cow. If you are finding high levels of ADIN in your forages, oxygen may be present in your silage.

After packing the next crucial step is covering the forage, with cover depending on the type of silo. The cover protects from further ingress of oxygen in during the first three phases of ensiling. A good cover should contain an oxygen barrier film for bunker silos, along with sufficient weight at key locations to protect against air getting under the cover. The physical integrity of the cover should be periodically checked and punctures should be repaired.

Next is the fermentation phase, or the buildup to fermentation. Once oxygen has been depleted through respiration in the aerobic phase, carbohydrates are converted to lactic acid. Sugar levels, pH, and temperature all decrease during this process.

The fermentation phase is where we see a large increase in the overall microbial population. Although there are many anaerobic microbes that may thrive in this environment, lactic acid-producing bacteria are most influential in determining the length of the fermentation phase. Lactic acid bacteria thrive in an environment with a pH between 4.0-5.0. Once the pH falls below 4.5, lactic acid growth begins to slow, and the silage will start to enter the stable phase. If you have

forages that were ensiled at a higher DM (hay crop in particular) that will struggle to produce enough lactic acid bacteria, an efficient inoculant containing homofermentative lactic acid bacteria is important to overcome the native microflora in order to speed-up the fermentation phase.

Silage will usually enter the stable phase between the second and the third weeks after ensiling. At this phase, the temperature and pH will stabilize. Although this is typically seen as the storage phase, there is still some microbial activity that will influence the nutritive value of the silage as well as the stability of silage against spoiling microorganisms. In corn silages, starch digestibility will increase during the stable phase. Enough enzymes will appear to break down zein proteins, which are the proteins that keep corn starch from being digested by the cow. Starch digestibility will reach a peak in corn silage about 6-8 months after the start of ensiling. If you harvested very mature corn with high indigestible starch, it may be a good idea to let that silage sit in the stable environment through the spring.

Uncovering the packaging while opening a silo is a balancing act between feed inventory and feed quality. The nutritive value of forages may increase the longer the silo spends in an anaerobic environment. As you begin feeding a new year of forages, be aware how your protein, fiber and starch levels will be influenced by your silo management, and how these nutrients will change in the coming months.

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**Happy Holidays and Best Wishes for 2020**  
**from everyone at Miner Institute!**



**YOUR DECEMBER  
FARM REPORT IS HERE  
ENJOY!**

### *Closing Comment*

A word to the wise is unnecessary; it's the stupid ones who need the advice.

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