FARM REPORT

MINER INSTITUTE
RESEARCH EDUCATION DEMONSTRATION
CHAZY, NY

In This Issue:

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FROM THE PRESIDENT'S DESK: NEW AGRICULTURE CENSUS

In April the USDA National Agricultural Statistics Service released the latest agricultural census data. The census data for agriculture is updated every five years, and this most recent edition covers 2017. If you're interested, the entire 820-page report can be accessed and searched online at: https://www.nass.usda.gov/AgCensus/.

This census confirms several long-time trends in American agriculture. Total farm numbers declined from 2.11 to 2.04 million since 2012. Interestingly, mid-sized farms continued to dwindle, but the number of small and large farms both increased. The largest 85,127 farms (≥2,000 acres) comprised 58% of all US farmland. Only 105,453 farms (out of over 2 million) resulted in 75% of all sales in 2017. So, the trend toward consolidation and larger farm size in the U.S. continues. However, regardless of size, 96% of farms and ranches remain family owned. This important fact is often missed by critics of contemporary American agriculture.

The top 5 agricultural commodities – cattle/calves, corn, poultry/eggs, soybeans, and dairy/milk – account for 66% of all U.S. agricultural sales. And the size and scope of American Agriculture is staggering, with approximately 255 billion dollars in total sales in 2017.

If we focus on the dairy industry, the 2017 census tells us that the number of dairy farms declined from 64,098 to 54,599 since 2012. But the number of dairy cows increased slightly over these same years from 9,252,272 to 9,539,631. So, we have fewer but larger farms - a trend reaching back decades.

As with the broader agricultural perspective, the dairy industry continues to experience tremendous concentration of milk production on fewer farms. In 2017, dairy herds with ≥500 cows accounted for 68% of milk sales and 66% of milk cows, although they comprised only 6.3% of U.S. dairy farms.

In addition to metrics of size and scope of U.S. agriculture, the 2017 census contains considerable information on the changing demographics of farming and ranching. The average age of producers has continued upward; in 2017, it was 57.5 years of age which was an increase of 1.2 years from 2012. The average age for producers reflects the fact that farmers between 35 and 64 years old make up 58% of all producers.

However, as we look to the future it seems clear that farmers will not simply age themselves out of existence. In fact, young farmers are increasing. In 2017, 27% of farmers were classified as "beginning farmers" which is a 5% increase since 2012. Interestingly, farms where young producers (i.e., <35 years old) make decisions tend to be larger than average in size and annual sales.

See **AG CENSUS**, Page 2

MILKING, IT'S A PAIN IN THE…BACK

I've heard several people claim: "My favorite childhood memory is waking up without any pain." We all wake up with aches and pains as we grow older. As a swimmer who sustained a shoulder injury and a hardworking employee of multiple different barns and farms, I feel this statement in my body every morning as I roll out of bed. I'm sure many people reading this article can empathize.

Parlor Type	Ideal Constant Factors
Auto tandem	0.85
Herringbone 50°	0.75
Parallel	0.7
Rotatory	0.75

Ideal constant factors for different parlor styles to calculate ideal pit depth to favor milking staff ergonomically. Modified from Cockburn, M., P. Savary, M. Kauke, M. Schick, U. Hoehne-Hückstädt, I. Herrmanns, and R. Ellegast. 2015. Improving ergonomics in milking parlors: Empirical findings for optimal working heights in five milking parlor types. J. Dairy Sci. 98:966-974

Multiple national and international studies have shown that farming is a physically taxing job with tasks that can cause musculoskeletal symptoms, i.e., aches, pains, or discomfort in a specific body part. Among agricultural workers there is an elevated risk among dairy farmers, specifically parlor milkers, to develop these symptoms. A 2013 study evaluated parlor workers from 32 large-herd dairies in several western states. They found that 76% of participants reported work-related musculoskeletal symptoms in at least one part of their body, with 55% reporting symptoms in their upper extremities, specifically in the upper back and shoulders. A similar study with Iowa dairy farmers in 2008 observed a similar percentage of musculoskeletal symptoms in the same areas of the body. Performing tasks in a non-neutral posture with repetitive movements is a common cause of these musculoskeletal symptoms. An example of this would be continuously lifting your arms above your shoulders. Sound familiar? It's safe to say that milking cows is a great example.

Of the six phases of milking, attachment and detachment of the milking unit have been reported to be the most strenuous and difficult tasks because it results in the highest level of muscle activation in the arm and causes static muscle loading (a contraction of the muscle with no resulting movement) of the neck and shoulders. In general, as the arm elevates, the shoulder blade moves in a greater upward and external rotation and tilts backward. (Try it! You can feel the rotation and the tilt.) These alterations can cause an imbalance of the muscles surrounding the shoulder, which when done repetitively can lead to the aches and pains associated with musculoskeletal symptoms.

Finding a working solution for this issue within our current systems can be challenging to address. It is not an easy task to keep udder height uniform, only have workers of a certain height, or design a parlor specifically for certain udder and milker heights. Changing udder height is not practical- cows have different udder heights, and it changes throughout their life. It is also not practical to only hire people who are 5 foot 6 inches tall either. A formula, called the Milking Health Formula, has been developed to take into account the height of a milker and constant factors associated with parlor types. This formula can be helpful for the construction of a new parlor or for dairies that have adjustable floors. The formula is individual milker height (cm) × parlor-specific constant factor − mean herd udder height (cm) = ideal depth of pit (cm). The constant factors were developed using a mathematical model using the statistical output from the recordings and analysis of different joints and body parts. The table summarizes constant factors from different parlor types that allow for the largest number of acceptable positions of joints in multiple body parts for the individual parlor styles.

See **PAIN**, Page 11

AG CENSUS, Continued from Page 1

If we dig deeper we find that one in four producers has ten or less years of experience and averages 46 years of age. So, overall even though the average age of farmers and ranchers continues to creep upward, younger farmers are moving into decision-making roles and are also growing as a fraction of total producers.

Finally, the 2017 census reported that male producers decreased by 1.7% over the past 5 years, while the number of female producers increased by 27%. In 2017, females made up 36% of all producers. The trend toward greater numbers of women in agriculture continues and is reflected in other areas as well such as more women in Animal Science and Veterinary Science programs across the U.S.

There is a tremendous amount of information on the current state of US agriculture in this latest census, and I'd strongly encourage you to take some time to see what comprises farming and ranching today.

— Rick Grant
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CULTIVATING CONSISTENCY TO HELP CALVES FLOURISH

Although common lingo when discussing calf nutrition, volume is not a requirement. Instead, calves have specific requirements for protein, energy, vitamins, and minerals. While volume may seem like a consistent way to provide nutrients to each calf, there can be underlying variability impacting the performance of your calves.

So, how does inconsistency affect the calf? In a study calves were fed either a fixed rate (1.50 lbs./day) or a variable rate (1.20, 1.66, 1.50, 1.80, 1.34, 1.50, 1.50 lbs./day over a week so that the average was 1.50 lbs./day) of milk replacer. Calves fed the variable intake of milk replacer had a 23% reduction in average daily gain by preweaning and a 10% overall reduction over 56 days. Furthermore, calves fed the fixed rate of milk replacer had greater starter intake and feed efficiency compared to the calves fed the variable rate even though they were fed the same total amount of solids during the study. The implications are that solids provided each day need to be consistent in both nonsaleable milk and milk replacer programs. Each have considerations for maintaining consistency and are discussed below.

Considerations for feeding nonsaleable milk. Nonsaleable milk can be an excellent nutrient source as long as the solids content is monitored and managed to provide a consistent supply of nutrients, and the bacteria counts are kept in check. Several studies have evaluated nonsaleable milk for composition and found it be quite variable. One study observed the most variable component of the nonsaleable milk to be total solids content, with an average of 11.2% and a range of 5.1 to 13.4%. Saleable milk typically averages 12.5% solids so characterizing this variability is important to successfully feed it to calves. Nonsaleable milk is much more variable than saleable milk because of the number of treated and transition cows included in the pool can change day to day, and between milking shifts. A higher amount of solids would indicate more colostrum, and transition milk included while a lower amount of solids may indicate contamination with water from washing procedures.

Other studies have observed similar ranges of nutrients, indicating that although calves are fed the same volume each day, they may not consume the same amount of nutrients which could negatively affect growth. As a best practice, when feeding nonsaleable milk the solids content should be measured at each feeding using a Brix refractometer. Using that information extenders, milk replacer, or individual ingredients can be included to help provide a more consistent source of nutrients.

Considerations for feeding milk replacer. Although milk replacer powder may seem like a consistent source of nutrients, especially compared to some of the variability of nonsaleable milk nutrients, there are other threats for inconsistency when feeding milk replacer. Milk replacer powder shouldn't be measured based on volume. There can be significant variability between the ratio of weight to volume between milk replacers, meaning one milk replacer may be denser than another. Inadvertently, this may lead to variability as the study described above where the overall average might be what you expect to feed your calves, but the inconsistent delivery could be negatively impacting growth. Therefore, milk replacer powder should be measured by weight. Directions for water temperature from the milk replacer tag should be followed to ensure proper suspension of the milk replacer powder. If solids content is higher than 13.5% then free-choice water should be available to calves at all times. As a best practice, the milk replacer powder should be measured to provide a consistent solids concentration from day to day.

Calves, like cows, are creatures of habit. Monitor and manage calf nutrition to provide consistency to help calves flourish in your calf program.

— Sarah Morrison
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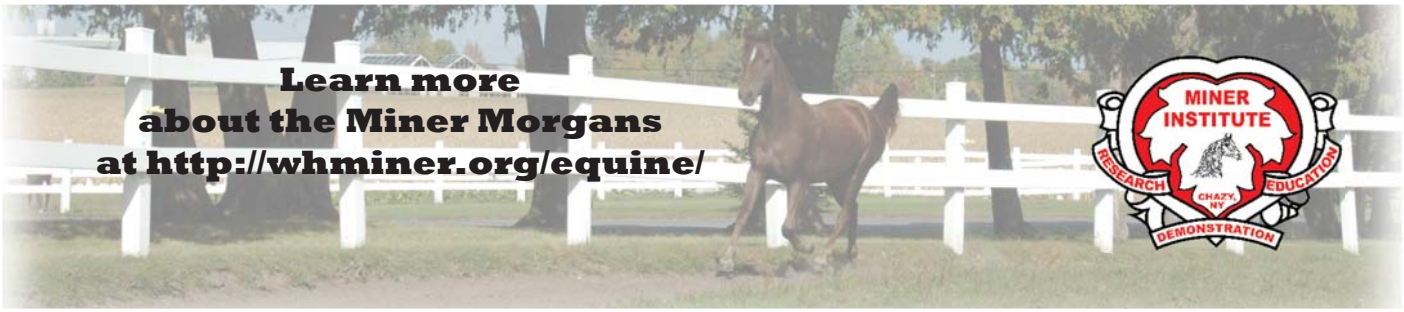

TILE DRAINAGE AND WATER QUALITY

	Runoff	DRP	Total P	Nitrate-N	Total N	TSS
	inches	----------	----------	lbs./Acre	----------	----------
Tiled Field	6.65	0.009	0.214	9.75	10.46	225.48
Untiled Field	6.09	0.007	0.217	2.33	3.55	273.80
Tiled - Surface	2.19	0.008	0.203	0.22	0.54	212.68
Tiled - Tile	4.46	0.001	0.011	9.53	9.93	12.80

As communities and watersheds struggle with recurring harmful and nuisance algae blooms, increased focus has been directed at tile drainage systems as a potential source of the nutrients that are leading to these water quality issues. Although some level of nutrient loss from these systems is inevitable, it's important to also recognize that tile drains are installed not just to improve crop yields, but also to minimize surface runoff and erosion. As phosphorus (P) readily reacts with soil particles, this reduction in erosion has the potential to have a positive impact on water quality.

Eliminating the use of tile drains may shut off this particular source of nutrients, but runoff of any form has the potential to transport nutrients from crop fields to surface waters. Many different environmental and management factors interact to determine how water moves over and through the soil and the level of risk of nutrient exports. While some studies have demonstrated that there is the potential for significant levels of P export from tiles in some cases, others (including here at Miner Institute) have found that tile drains may also contribute only a small percentage of P loss when surface runoff and tile drainage from the same field is continuously monitored. Therefore, it's important to directly compare the magnitude and forms (dissolved vs soil-bound) of nutrient losses from fields with and without tile drainage.

Unfortunately, there are relatively few studies that have performed this direct comparison. Many studies have reported on the nutrient losses in surface runoff and tile drainage from the same field, and while this is valuable information, it doesn't tell us what the quality of the runoff would be if the field didn't have tile drainage. With funding from the Northern New York Agricultural Development Program (NNYADP), Miner Institute began a collaboration with Adirondack Farms for an edge-of-field monitoring project on two of their fields.

These adjacent fields are similar in size (5.8 and 5.9 acres), composed of the same soil type (somewhat poorly drained silt loam; Tonawanda series) and have mild slopes to enable surface runoff monitoring at a corner of each field. In 2016 one of the fields had tile drainage installed at 35 ft spacing and 4 ft depth. Both fields are managed as corn for silage and are managed identically (nutrient timing, rate, etc.). Monitoring of these fields began March 28, 2018 and the 2018 data was summarized (see table) for a NNYADP Project Report.

As with most environmental research projects, the longer the time period of data collection, the more confidence we can have in the results. As the data in this table only represents 8 months of monitoring, we shouldn't rush to any conclusions. However, it is still worthwhile to look at some of the broad trends. The first two rows in the table represent the total runoff and nutrient loads from the tiled (TD) and the untiled fields (UD). The third and fourth rows of data are a breakdown of runoff and nutrient loss by runoff pathway (surface vs. tile) in the tiled field.

Total runoff from TD and UD was similar, but only 33% of runoff from TD occurred as surface runoff. Despite this difference in runoff pathways, the overall losses of dissolved reactive P (DRP) and total P were similarly low in both fields, with the majority of P losses from TD occurring in surface runoff. Not surprisingly, changing the primary runoff pathway from the surface to the subsurface in TD increased the rate of nitrogen loss (a water soluble nutrient) and reduced the rate of sediment loss (TSS). Additionally, yields in TD were 30% greater than in UD.

This first year of data indicates that the installation of tile drainage didn't dramatically change the level of P losses from TD relative to UD but did result in substantially greater crop yields. We are fortunate to have received another year of funding from NNYADP for 2019 and so our monitoring efforts are ongoing to strengthen the dataset. Overall runoff rates were low in 2018, but with the cool, wet spring we have had so far, it will be very interesting to see how the patterns observed in 2018 and 2019 will compare.

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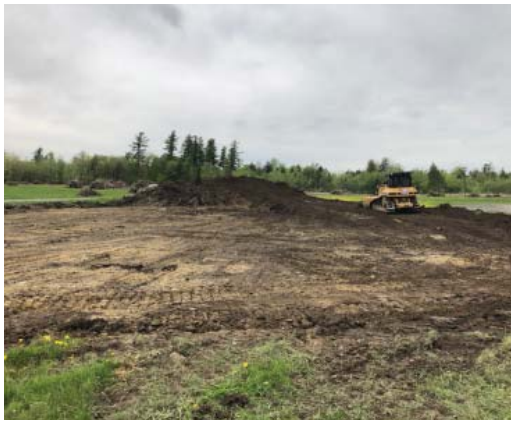
WHAT'S HAPPENING ON THE FARM

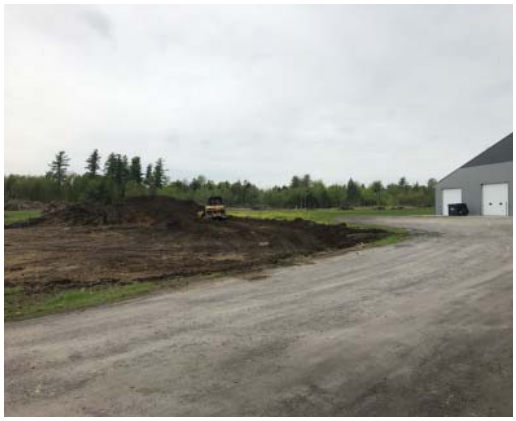
Well, I think it's finally safe to say that winter has passed! If you're from the Northeast you know not to make that bold statement in early May! But now, as I write in late May, the things outside that looked dead and cold for months, are now green and full of life. The biting wind that froze your face is now a warm breeze that brings the scent of freshly worked dirt and mowed grass. OK, to be realistic, the pollen and black flies and rain and mud are all part of springtime too, but for the most part, I love this time of year!

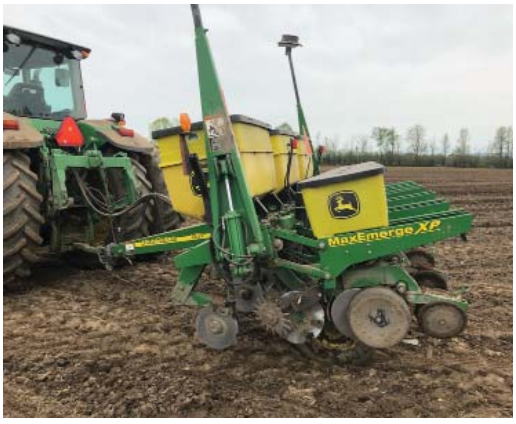
We have some corn and new grass seedings in, but still have quite a few acres to disc harrow, rock pick and plant. It's been a very wet spring here in Chazy; we weren't able to get onto the fields as early as we'd like. The established hay fields are growing fairly well despite the rainy conditions – we do get a couple sunny days in between the rainy ones, but first cutting won't be until early June.

This year we are planting 150 acres of Mycogen Unified corn and 275 acres of conventional corn hybrids. Unified is a BMR corn promoted as having softer kernel texture and higher starch digestibility. We've planted some over the last couple years and had good success with it. The price of the corn seed is high, but we've been happy with the yield and the starch and fiber level in the silage.

Construction has started on a new bunker silo wall. We have limited space for feed storage on the farm, and we always have more forage than room in the bunkers so we end up making several small piles of feed that aren't really efficient use of space - not to mention the feed lost to spoilage around the edges of a small pile of feed. We are looking forward to a new bunker silo this year! The one we put up last year was open ended so we could feed from either end, which is convenient but reduces the amount of available feed storage. This new silo will have a concrete wall on one end with a sloped asphalt floor for drainage.







Site prep has begun for the new barn construction! Orange flags mark the site and this week the bulldozer started removing topsoil. We will be trucking in gravel to create a solid base for construction. In the meantime, it's been a light spring calving season, which means we are not so overcrowded in the current barn. But summer will be busy in the maternity pen, and there are quite a few heifers due over the next five months… we'll be looking for more stalls soon!

This summer we have three new studies starting – a calf milk replacer study, a heat stress study with rumen pH and body temperature loggers, and a tie-stall study with cannulated cows to continue some of the work in the area of uNDF. In preparation for a study we meet regularly with the researchers leading the study to coordinate details such as forage needs, a cow list and start date. As with so many things good communication is key, and over the years we've learned to work well together to accomplish excellent dairy research. We have done numerous cow trials, and we know the routine and the things required from both dairy and research sides to get a project up and running and finished successfully. With the addition of Dr. Sarah Morrison to the research staff, we are starting to branch into more calf and heifer research. This has required a new level of cooperation as we coordinate the details for the upcoming calf study and determine the roles of both the farm and research staff. We are working hard to have all the details in place for when the busy summer calving arrives so that we will be ready to enroll the heifer calves onto the study.

The cows continue to milk well although we've been struggling to keep our milk fat percentage between 3.9-4.0%. We have had a lot of forage changes this spring, and the near constant rain has been a feeding challenge as well. Our herd pregnancy rate is at 26% and we are glad to be heading into the summer months with 64% of the herd pregnant. We know the hottest months of the summer will challenge the cows, and conception rate will drop, even though we have fans and sprinklers in the holding area and over the feed bunk. As the heat stress study gets underway, it will be really interesting to know the daily body temperatures of the cows with the indwelling temperature loggers.

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CORN SILAGE HYBRIDS: COST OF DIGESTIBLE FIBER

Corn silage is one of the main feedstuffs for lactating dairy cows due to relatively high yields and providing not only digestible fiber but also starch. In a previous Farm Report from October 2018 titled "The next step in corn silage hybrid evaluation: fiber and starch yields," I discussed a corn silage hybrid trial conducted at Miner Institute for 3 years (2015-2017) that compared brown midrib-3 (bm3), bm1, and non-bmr hybrids. This article also discussed fiber and starch yields and a spreadsheet that was available on the Miner Institute website to calculate them. A new version of this spreadsheet is available that can help calculate the cost of corn silage and its quality measures and cost comparison between the hybrids. It is available online http://whminer.org/dairy/ under "Dairy Management Tools" called "Corn Silage Hybrid Fiber and Starch Yields Calculator – Miner Institute May 2019".

	Hybrids				
	1	2	3	4	5
Item ($/ton on a DM basis)	bm3	bm3	bm1	Non-bmr	Non-bmr
Yield	97.7	94.5	84.6	72.7	76.3
NDF	37.2	34.9	31.0	27.6	30.0
uNDF 240-h	6.5	5.9	7.8	7.3	7.5
pdNDF	30.7	29.0	23.2	20.4	22.5
Starch	32.7	30.5	29.8	25.8	26.5

Table 1. Cost of yield and nutrients for hybrids grown at Miner Institute, Chazy, NY, 2015-2017.

	Hybrids				
	1	2	3	4	5
Item	bm3	bm3	bm1	Non-bmr	Non-bmr
Corn silage cost, $/hd	1.03	0.99	0.89	0.76	0.80
Feed cost, $/hd	8.03	7.99	7.89	7.76	7.80
Income over feed cost (IOFC), $/hd	7.97	8.01	8.11	8.24	8.20
Predicted DMI based on NDFd 30-h, lb/d	62.9	62.7	61.1	60.0	60.3
Predicted FCM based on NDFd 30-h, lb/d	105.2	104.8	101.9	100.0	100.6
Adjusted feed cost, $/hd	8.41	8.35	8.03	7.77	7.84
IOFC for predicted DMI and FCM, $/hd	8.42	8.42	8.28	8.24	8.25

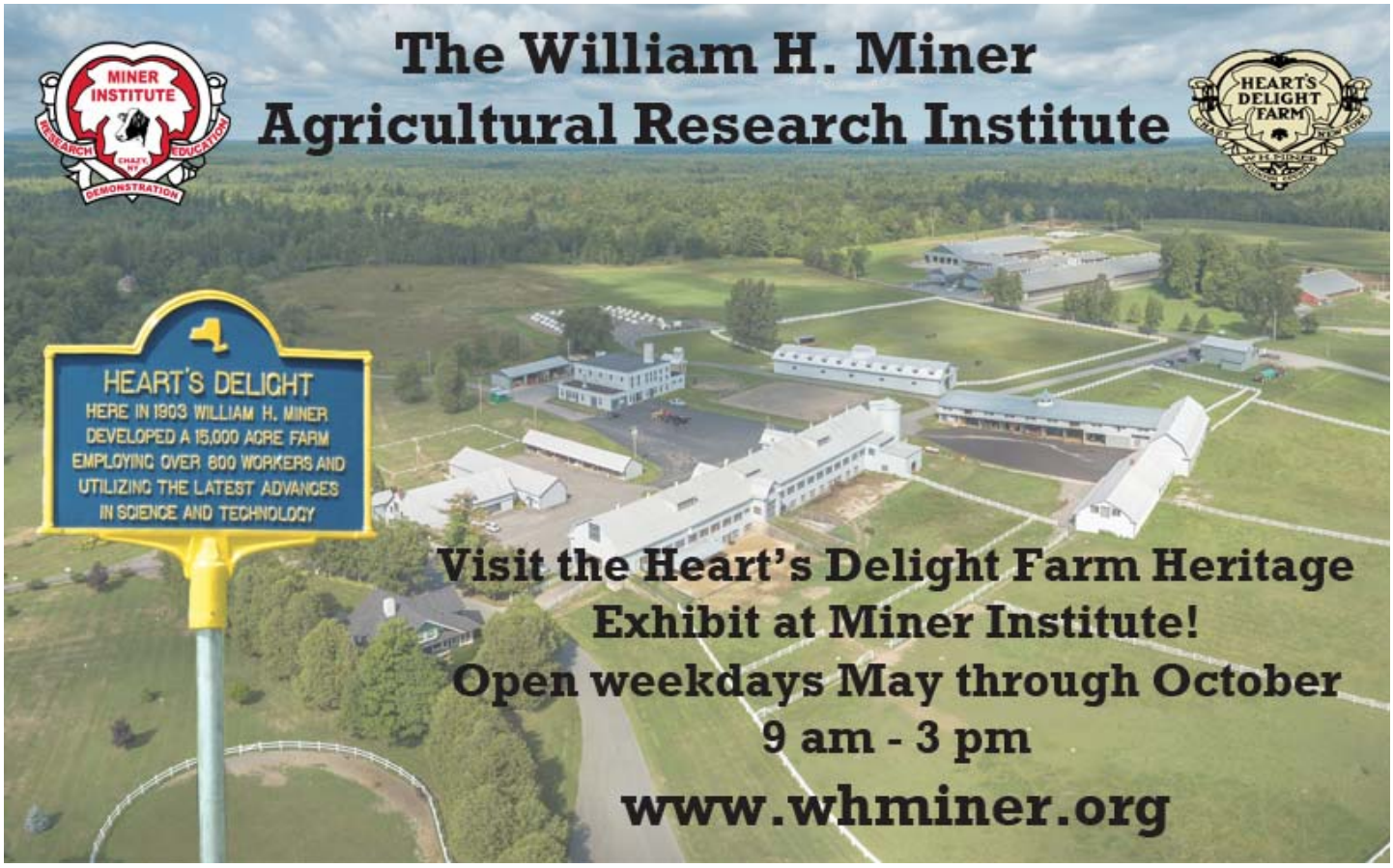
Table 2. Cost comparison of hybrids grown at Miner Institute, Chazy, NY, 2015-2017.

There are 6 sheets within the spreadsheet: 1) an instructions page labelled "Instructions", 2) a page to insert data called "Insert data", 3) a results sheet called "Yields", 4) a page to calculate costs called "Cost", 5) a page for results from the cost sheet called "Cost of fiber", and 6) a page for the cost comparison between hybrids called "Cost comparison". On all sheets, the grey boxes are for inserting data, and the green boxes are for calculations. To calculate the fiber and starch yields, insert yield and forage analysis in the "Insert data" sheet, but make sure that the units are the same as the column headings. Once the data is inserted, then go to the "Yields" sheet and the fiber and starch yields are calculated. To sort hybrids based on one of the measures use the little drop-down box next to the measure's name.

On the "Cost" sheet insert the number of acres planted, planting population, cost of seed per bag, cost of planting, cost of fertilizer, cost of chopping, and cost of hauling. These are broad categories and meant to be flexible for a wide range of users. An example is if a fungicide is used, then that could be included under the cost of fertilizer, and costs should be based on your operation. The numbers used for the "Cost" sheet are from Cornell Cooperative Extension. Once the numbers are inserted in the "Cost" sheet, the results will appear on the "Cost of fiber" sheet. For the "Cost comparison" sheet insert dry matter intake (DMI), % of corn silage in the diet, fat-corrected milk (FCM), average NDF digestibility (NDFd) at 30-h, milk price, and feed cost that does not include corn silage. These instructions are also on the first sheet.

The spreadsheet includes the hybrids from the corn silage hybrid trial mentioned above. The bm3 (hybrids 1 and 2) and bm1 hybrids (hybrid 3) have a higher cost per ton than the non-bmr hybrids (hybrids 4 and 5; Table 1). The price difference in this comparison is driven mainly by the cost of seed and to a lesser extent the yield of the hybrid because these hybrids were planted and harvested in the same field at the same time. The bm3 (hybrids 1 and 2) had a lower cost per ton of undigested NDF at 240-h (uNDF at 240-h) and a higher cost per ton for potentially digestible NDF (pdNDF) than the bm1 (hybrid 3) and non-bmr hybrids (hybrids 4 and 5). This is due to bm3 hybrids having a lower amount of uNDF240 and a higher amount of pdNDF than the bm1 and non-bmr hybrids. These costs can

See **HYBRIDS**, Page 7



HYBRIDS, Continued from Page 6

help to calculate a more accurate feed cost for your operation.

The cost comparison sheet example uses a high producing cow consuming 60 lbs. of DM and producing 100 lbs. of FCM. The diet contains 35% of DM as corn silage and feed cost for everything except the corn silage which is $0.18/lb. The example compares the income over feed cost (IOFC) for all corn silage with the assumption that the cows will perform the same when fed any of the hybrids. The bm3 (hybrids 1 and 2) and bm1 hybrids (hybrid 3) have a lower IOFC than the non-bmr hybrids (hybrids 4 and 5; Table 2). This difference is driven just by the cost of the seed and does not account for quality differences between hybrids. The bmr hybrids (hybrids 1, 2, and 3) have lower uNDF at 240-h and higher NDFd at 30-h which allow cows to eat more and produce more milk. In a conference proceeding from Tri-State Dairy Nutrition conference, the authors reported a 0.26 lb. per day increase in DMI and 0.47 lb. per day increase in 4% FCM with a 1%-unit increase in NDFd. This relationship was used to predict DMI and FCM based on NDFd. The predicted DMI was 2.8 lbs. higher for bm3 (hybrids 1 and 2) and 1.1 lbs. higher for bm1 hybrids (hybrid 3) compared to the non-bmr hybrids (hybrids 4 and 5; Table 2). The predicted FCM was 5 lbs. higher for bm3 (hybrids 1 and 2) and 1.9 lbs. higher for bm1 hybrids (hybrid 3) compared to the non-bmr hybrids (hybrids 4 and 5; Table 2). A new feed cost was calculated using the predicted DMI, and then new IOFC was calculated using the predicted FCM. The cows fed the bm3 hybrids (hybrids 1 and 2) had $0.31 higher IOFC than the non-bmr hybrids (hybrids 4 and 5). The cows fed the bm1 hybrid (hybrid 3) had $0.09 higher IOFC than the non-bmr hybrid (hybrids 4 and 5). This comparison focuses on fiber digestibility and does not account for starch content or digestibility.

Corn silage is a main forage fed to lactating dairy cows and is a significant investment for dairy producers each year. With tough financial times for the dairy industry, it is vital to make sure each investment will be beneficial to the farm's bottom line. Make sure to involve your nutritionist, agronomist, and anyone else that plays a vital role for corn silage selection to ensure that the hybrid fits your farm's needs. The excel sheet referenced above will help to identify hybrids that provide the highest quality based on fiber and starch yields and now can be used to calculate the cost and compare hybrids based on fiber digestibility.

— Mike Miller
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COPING WITH A DIFFICULT CROP SEASON: PART ONE

There are three types of people: Those who make things happen, those who watch things happen, and those who wonder what happened. You can't afford to be anything but the first type, every cropping season but especially this one. It may seem a long time before fall corn silage harvest, but you should already have a fair indication of where you'll be in late September — and plan accordingly. Late-planted corn will do some "catching up" during the growing season, unusually warm temperatures would also help, but most corn fields planted to full-season hybrids that aren't "knee high by the 4th of July" (a long- outdated rule of thumb) won't mature to at least 32% DM by the average first frost date. Many farmers will have big differences in corn maturity from field to field.

As the summer progresses, you'll need to start planning where you'll put crops with widely varying moisture contents and qualities. If you have both tower and bunker silos, consider putting hay crop silage or 32+ % DM corn silage in the uprights. Immature corn silage in a concrete stave silo can really make a mess, and the acidic "silage juice" increases deterioration of the bottom staves. I've seen concrete stave silos ruined by only five years of under-30% DM corn silage. There's no ideal place for immature corn silage ("corn slush"), but drive-over piles and bunker silos would be a better place for this forage if you can manage the silage effluent. Using a silage processor on immature corn increases silage effluent — so don't. Even with improving milk prices dairy farm finances will remain stressed, but I still recommend using a bacterial inoculant on all ensiled forages. A penny saved is a penny earned…but what if that penny invested in the right practice or product will return several pennies?

— Ev Thomas
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COPING WITH A DIFFICULT CROPPING SEASON: PART TWO

Winter damage to alfalfa this past winter was unusually severe, from the northern Midwest through the Northeast. Many farmers haven't yet dealt with the impact of this, in part because it was so difficult to do anything in the field this spring. When the weather improved enough to do something, either forage seedings or corn planting took precedence over ravaged alfalfa and alfalfa-grass fields. Farmers in the Northeast are in somewhat better shape because unlike in the Midwest most of our alfalfa is seeded with a forage grass. This allowed some farmers to harvest a fair crop of grass, probably not a good yield but better than nothing. Now, however, decisions will have to be made about what to do with these fields. Following are a few comments:

- Seeding alfalfa-grass back into a winter-damaged alfalfa field in the coming weeks is not recommended. While an interval of 2-3 weeks should eliminate the autotoxic effects on germination and plants per square foot, the impact on alfalfa root development and long-term forage yields can persist a lot longer. Better not to take the chance.
- If you feel that you must establish a perennial forage crop on these fields, red clover-grass would be preferable to alfalfa-grass. Alfalfa autotoxicity wouldn't be a problem, and if managed as hay silage (not dry hay!) red clover can be a productive, high-quality forage. It normally won't last as long as alfalfa, but then neither did many alfalfa fields due to the ice sheets of the winter of 2018-19.

— E.T.

VIVA LA RESISTANCE: THE CRUMBLING DEFENSE OF ANTIBIOTICS

One Sunday morning not long ago I was sitting on my friend's porch in my former Boston neighborhood sipping coffee and paging through the New York Times. My friend tossed a section of the paper onto my lap. "Oh, this is ALL you", she said. I picked up the paper to see a headline alerting the universe to yet another "superbug"; this one, a rogue fungal infection running rampant through hospitals with no way to treat it. (Facepalm emoji).

A collaborative effort between the veterinary and medical sectors known as "One Health" is aiming to create better programs, policies and research for public health. While One Health's main area of focus is zoonotic disease, it recently has dedicated more attention to antibiotic resistance. Since animals and humans share a mutual dependency and an ecosystem (and many of the same antibiotic treatments), One Health recognizes this relationship and believes that a balanced approach in all three segments (animal, human, and environmental) is the most effective way to combat future resistance, reduce spread of disease, and preserve what benefit antibiotics on the market still have. While it is not possible to determine exactly where and when antibiotic resistance began, nor place the responsibility entirely on one sector, mitigating the issue on only one end is not enough to create a solution.

"Why can't we just make new antibiotics if the ones we have don't work?" I'm going to make what I would consider a bold, yet undeniably true statement: new antibiotics cannot be developed and approved for use fast enough to outrun the rate at which bacteria are becoming resistant. Between development and the FDA's review and approval process, it can take years for new drugs to come to market. I'm not going to hop up on the soapbox and tell you what you probably already know. Rather, I want to reinforce why it's important that we take ownership of antibiotic stewardship, both in our personal use and within the agriculture industry. While we can't manipulate the FDA's approval timeframe, we can certainly be more in control of how and when we choose to use existing treatments.

For years, it was common practice on farms to provide a long-term sub-therapeutic (lower) dose of broad-spectrum antibiotic such as tetracycline, streptomycin, and bacitracin as a mass prophylactic (preventative) treatment to herds or flocks in which some (but not all) animals were showing signs of illness, or as a growth promotion method. The FDA's Veterinary Feed Directive has since restricted this practice, but not without consequence. Pre-emptively medicating animals or finding a more economical substitution for higher-quality feed may have curbed certain illnesses and promoted growth, but also contributed to resistance in certain strains of common bacteria such as E. coli, Klebsiella, Salmonella, and Campylobacter- and showed very little economic benefit. Because most of these antibiotics are also used to treat humans, reducing their effectiveness creates a considerable public health threat, especially since some of these bacteria are common foodborne pathogens. If this trend were to continue, there will very limited treatment options for both humans and animals- and results of untreated infection can be fatal. In addition, the mention of 'antibiotics' in the same sentence as 'agriculture' often causes discord among consumers and raises concern about animal welfare or food quality. Not only will more controlled use of antibiotics contribute less to resistance, it will also help convey a more positive image for agricultural practices and can improve consumers' opinion of agricultural products.

The good news is that more effective use of antibiotics usually requires just some attention to detail. Rather than just broadly treating at the first sign of illness, taking into consideration the right treatment, for the right animal, at the right time can help determine a more efficient course of treatment, and at the correct dose and duration. Targeted treatment programs and protocols, as well as not just dosing based on signs, have had notable economic benefit. For example, selective treatment of dry cows rather than blanket dry cow therapy for mastitis prevention as a means of reducing antibiotic use is a practice that is gaining traction. Several studies conducted to determine economic impact of more sound antibiotic use practices reported savings of approximately $20-60 per cow/year. Saving the cost of a course of treatment means less milk withheld from your tank, less withdrawal time, less visits from your veterinarian, and more money in your pocket. Your veterinarian would be pleased to help you develop a treatment protocol for your herd, or advise you on how to better structure your treatment approaches based on your farm's needs and your production levels. Regardless of whether you use or prescribe antibiotics, the responsibility for their judicious use lies with us. It's time we B.cereus* about how we approach antibiotic use.

*In laboratory tests, B.cereus was found to exhibit resistance to bad puns.

— Cari Reynolds
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HAY IS FOR HORSES

Reading farm magazines is an efficient process for the Crop Dude because I skip most articles on pasture management and anything to do with baled hay. Very few dairy farmers I deal with manage pastures intensively (or at all for that matter), nor do they have any expressed interest in doing so. The objective for some seems to be to turn their heifers out to pasture in the spring and hope that there's approximately the same number when they go out to fetch them sometime later. As for articles on dry hay production: New type of large package baler? Not interested. Hay storage options? Knock yourself out. Sisal vs. plastic twine? Meh.

My dry hay hang-up is partly due to frustrations early in my career at Miner Institute, when the crop operation was responsible for supplying hay for our Morgan horses. By agreement there were supposed to be no more than 18 horses on the farm. Nice idea, but there were usually more than that because the horse crew would import stallions to breed the Institute's mares and mares were brought in to be bred (for a fee) by our stallions, a "pay to play" enterprise that seemed a bit licentious. There were also "borrowed horses", something I never did quite figure out. I used to suspect that the horse crew was hiding an over-the-limit horse or two somewhere on the farm, in a wooded pasture or one of the many box stalls, and since the critters were all brown they figured that I couldn't tell one brown horse from the other. (I was born on a Sunday, but not last Sunday.) The main reason I wanted to keep horse numbers in check: More horses = more hay.

Miner Institute's dairy operation was expanding so we were challenged to provide more forages for the dairy herd, let alone hay for the horses. We were using organic acid on the hay produced on the farm but the horse crew didn't like it so we started contracting with an area farmer to supply baled horse hay.(Or rather "Hay for the horses" since "horse hay" has a widely different meaning depending on whether you're feeding racehorses or a backyard horse. The farmer was selling us hay not by the bale but by the ton; a wet bale weighed more than a dry one and therefore was worth more to him – but not to us. We reserved the right to reject wet bales but that meant that the people unloading hay (often college students with no experience in handling hay) were making these on-the-fly decisions. We fired that supplier, turned the whole horse hay business over to the equine crew and let them source and purchase their hay needs. This experience left me more convinced than ever that hay silage was the only way to go for our dairy herd. We made very few bales of hay on the Institute farm in the following years and our hay baler eventually became covered in pigeon poop, which was just fine with me.

The main reason for my disinterest in dry hay production is that it's simply a poor way to make high quality forage in the Northeastern U.S given our ever-changing, hard-to-predict weather. It takes at least one extra day — often two — to make dry hay vs. 35-40% DM hay silage. We can often stretch that on either end to 30-50% DM, though over 40% DM isn't recommended for grass silage. The quicker we can get "from stem to storage", the lower the field losses and the higher the forage quality. And with labor an increasing problem on dairy farms, it's a lot easier to mechanize hay silage production than it is baled hay. The trend is to larger, more highly mechanized dairies, which means less and less dry hay on these operations. Hay is for horses – and they're welcome to it.

— *Ev Thomas*

MINER INSTITUTE IS SEEKING A DAIRY HERDSPERSON

Qualifications

- Associates degree or bachelor's degree is preferred with a preference for degrees in dairy or animal science with experience as a herdsman.
- Must have a valid driver's license and be able to pass a drug test.
- Must have the ability and willingness to work independently. Herdsperson will need to adjust their days off to cover when needed.
- Be able to train and manage dairy employees, students: ensuring that all tasks are completed properly and in a timely fashion.
- Must have good communication skills and interact cooperatively with coworkers
- Skid steer and tractor experience is preferred.
- Must have ability and willingness to adhere to stringent research protocols.
- Flexibility to adjust to changing priorities of a modern dairy farm and research institute

Job Details

- Monitors the health of all animals on the premises and notes any behavioral changes.
- Treats injuries or illnesses as they occur.
- Monitors hoof health.
- Gives vaccinations and other injections.
- Manages reproductive program and assists with calving.
- Maintains comprehensive health and production records in DairyComp305.
- Works closely with the veterinarian during examinations and to insure herd health.
- Must have basic knowledge of milking parlor and other equipment; ability to troubleshoot any mechanical problems or other issues as they arise.
- Additional duties assigned by the Farm Manager.
- Play an active role in the formulation of new protocols, farm management discussions, technical meetings, and help set farm direction.

Pay is commensurate with qualifications and experience. Miner Institute offers a generous benefits package including an employer-funded retirement plan, paid time off, health insurance and more. If interested, contact Steve Couture for more information at (518) 846-7121 ext. 133 or (518) 569-4566 or email couture@whminer.com.

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For example, if you have a parallel parlor your ideal constant factor is 0.7, you are around 5'10" (177.8 cm), and your mean herd udder height or the distance between the udder and the ground is close to 2 ft, so around 54 cm. (This measurement is time-consuming but essential for the formula to work properly.) So after inputting your information into the formula, 177.8 x 0.7 – 54 = 70.46 cm, your ideal pit depth would be 2.3 ft

Unfortunately, this doesn't help working parlors with stationary floors. There are a few recommendations to help in this situation. A step stool can help if your shoulder is below udder height, or if you are too tall use your lower body to adjust the height of your shoulder relative to the udder. Another suggestion that helps alleviate these symptoms in all workers, no matter their height, is the use of a lightweight milking unit. A difference of two pounds of weight can make a drastic change in workload. Constructing the milking unit out of lightweight composite material has the potential to reduce muscle activity as well as non-neutral postures. The use of quarter individual milking units has also shown promise. Due to the single tube, static work is no longer required to hold the unit beneath the udder, and the duration of muscle activity is also less. In this study they used a Multilactor, but there are similar models on the market today.

Milking is a physically demanding task that has the potential to cause musculoskeletal symptoms. Precise guidelines for parlor dimensions for different parlor styles are difficult to recommend because of differing udder heights and individual milker heights. When constructing a parlor, using the Milking Health Formula to calculate the precise pit depth can help with the longevity and safety of your workers. For those with working parlors, lightweight units or quarter individual milking units is an alternative suggestion.

— *Katie Smith*
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Closing Comment

You can't lose a homing pigeon. If your homing pigeon doesn't come back, then what you've lost is a pigeon.

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