

# FARM REPORT



## In This Issue:

A Dog's Breakfast	2
A Fat Milk Check	3
Staph Meeting: A Different Approach to Treat Mastiitis	4
Best Practices for Manure Management	5
Dairy Day 2019 Investments vs. Expenses	6
A Fourth "Major Nutrient"	7



Visit our blog:  
[minermatters.com](http://minermatters.com)

 Like us on  
**Facebook**  
[facebook.com/WhMinerInstitute](https://facebook.com/WhMinerInstitute)

## FROM THE PRESIDENT'S DESK: REFINING INTAKE PREDICTION EQUATIONS

Accurately predicting dry matter intake is critical when formulating rations. Equations in use today mostly are driven from cow variables: milk yield, body weight, and days in milk. Perhaps the most commonly used equation in the U.S. is from the NRC (2001) which uses 4% fat-corrected milk yield, body weight, and week of lactation.

A recently published paper from Michigan State University (de Souza et al., 2019. J. Dairy Sci. 102:7948) expanded on the NRC (2001) equation by including body condition score and body weight – two important sets of data that weren't available to the NRC committee nearly two decades ago. In addition, their database of over 2,700 cows better represents prevailing genetics and management practices in North America.

The new and improved dry matter intake equation that the group developed is detailed in the paper for those who want to use it. It contains factors for parity, milk energy, body weight, body condition score, and days in milk. This new model has both a smaller mean bias, root mean square error, and higher concordance correlation coefficients – all very good things in case your statistical knowledge is rusty! – than the NRC (2001) model. Based on this report, folks who formulate rations should consider moving to this newer dry matter intake equation to

improve their ability to feed lactating cows.

Even though intake prediction equations such as NRC (2001) are commonly used, previous research tells us that equations containing both animal and nutritional factors actually work better at predicting feed intake.

A new equation to predict dry matter intake based on the filling effect of the diet has also been published recently by the same Michigan State group (Allen et al., 2019. J. Dairy Sci. 102:7961). The idea behind this approach is that undigested feed in the rumen limits feed intake together with the cow's body size and milk yield. To what extent rumen fill may limit feed intake varies with milk yield and energy needs of the cow.

Thirty-four published experiments from 1990 to 2015 comprised the data base. The full equation is detailed in the paper for those who want to test it out. This model included factors for crude protein, ADF, NDF, forage-NDF, ADF/NDF, forage-NDF digestibility, and milk yield.

Dry matter intake was positively related to milk yield and ADF/NDF and negatively with forage-NDF. Interestingly, forage-

See **INTAKE**, Page 2

# A DOG'S BREAKFAST

“A dog’s breakfast” is British slang that’s been in use for over 100 years, referring to a confused mess or mixture. That’s an apt description of what some dairy farmers are facing this fall as they consider the highly variable quality of their ensiled forages. Silage quality always varies to some extent because silos contain several cuttings of alfalfa, and often from fields varying in their proportions of alfalfa and grass. In most years corn silage is the relative constant in forage programs, with the biggest difference often between conventional and BMR corn silage. However, in 2019 corn planting on many farms extended from early May through mid-June or later. Persistently wet spring and early summer conditions resulted in more difference than normal between a farmer’s well-drained fields and his moderately drained ones.

Corn chopped at the milk stage or earlier will be lower in starch than that harvested at approximately half milk line. That will probably be the biggest quality difference since the fiber digestibility of milk stage plants is fairly good and crude protein might even be a bit higher than at half milk line. The biggest difference will be in dry matter yield — so a greater difference in milk per acre than in milk per ton.

How much effect variable forage quality will have on feeding programs depends in part on the type of silo storage. Significant quality changes in corn ensiled in upright (tower) silos can occur almost overnight as the silage is fed out. A few broken-up Styrofoam egg cartons sent up the blower between fields can indicate that a change in forage quality is about to occur. Rapid changes also occur in silage bags, so it’s a good idea to use a waterproof marker to label the forage from each field as it’s ensiled. Bunker silos result in more gradual quality changes since forage is ensiled in roughly horizontal layers and removed vertically using a silage facer or by shaving the face from top to bottom. However, many bunker silos are filled using the “progressive wedge” system, which is an efficient way to fill large bunker silos but can result in significant differences in quality as the silage is fed out. Drive-over piles will probably have similar issues. Though you probably won’t read this anywhere else, I think that bunker silos that can be filled in a day or two should be filled in horizontal layers, not by using a progressive wedge. A bigger challenge with fast filling, though, is adequate compaction which means having at

least one heavy packing tractor on the pile during the entire filling process.

So, what to do about highly variable silage quality? Test, test, test! The results may not be pretty, but better to know than not to know. However, DO NOT attempt to sample through the sides of silage bags. There are several suggested methods for doing this. None of them work. How often you submit samples to a forage lab is between you and your dairy nutrition consultant, also the option of NIR vs. wet chemistry. If you aren’t doing regular (and frequent) on-farm dry matter tests, now is a great time to start. A Koster Tester will do the job, and Nasco now sells these testers either separately or with a postal scale — not one of those infernal spring scales that used to be included with the tester. A large-scale custom operator in Texas told me that in the old days whenever he bought a Koster Tester he made sure that his guys didn’t use the spring scale included with it. He’d put the shiny new scale behind the tire of a forage chopper or big tractor and back up several feet. Problem solved — or at least prevented.

— *Ev Thomas*  
*ethomas@oakpointny.com*

---

## INTAKE, Continued from Page 1

NDF digestibility was positively related to intake for cows with high milk production but was negatively related to milk yield for cows with low production.

Intake was significantly related with the ADF/NDF ratio as a proxy for forage fragility related to natural differences between legumes and grasses. Intake was positively related to forage-NDF digestibility for low ADF/NDF forages (i.e., more grass), but negatively related to forage-NDF digestibility for high

ADF/NDF (i.e., more legume). More research is needed to fully flesh out these interesting differences in NDF digestibility, fragility, and intake.

The NRC (2001) intake equation without dietary factors had a higher root mean square error and over-predicted dry matter intake at high intake levels, but under-predicted intake at lower levels of dry matter intake. But overall, this new equation is an improvement on the NRC (2001) equation.

An equation that takes into account forage characteristics will be useful for those who want to predict intake as it relates to the rumen filling effect of the diet. Importantly, the first intake equation, based on a full suite of animal factors, provides a much-improved prediction of dry matter intake and ought to be used going forward when formulating rations for lactating cows.

— *Rick Grant*  
*grant@whminer.com*

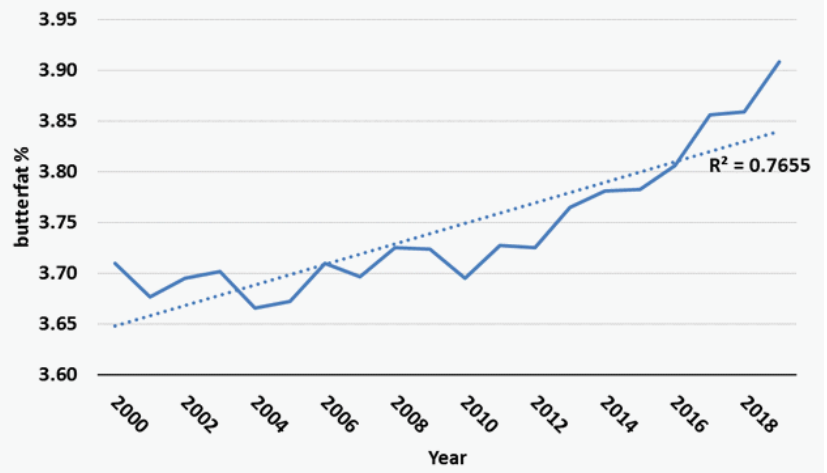
# A FAT MILK CHECK

When it comes to milk revenue, components are king. Growing up, I remember how closely my parents would watch the protein and fat yield in our milk check. Dairy processors and farmers know that the nutrient profile of the milk is valuable but the question is, exactly how valuable?

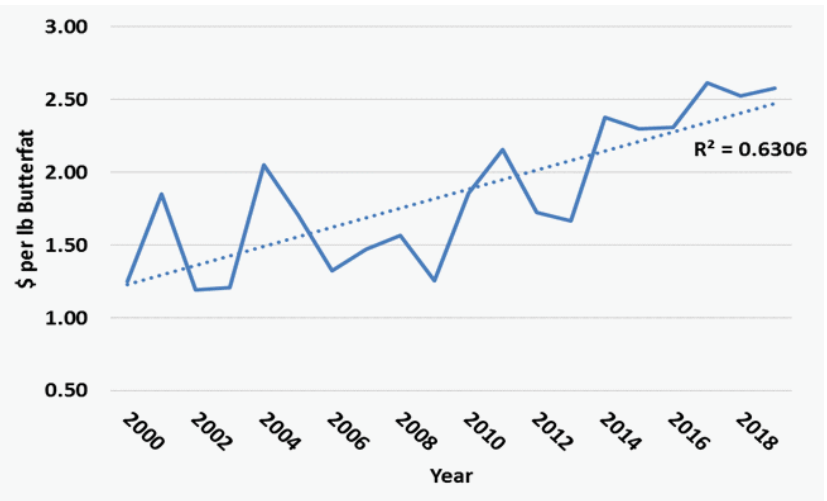
In the July edition of *Hoard's Dairyman*, the editorial comments focused on how demand for milk fat has revived after a half century of little consumer preference. About 14% of skim milk is exported by the U.S., while only 2% of milk fat will leave our borders. Americans are using milk fat again, and with that increase in demand, U.S. dairy farmers are increasing the milk fat percent in the milk shipped out the door. We're seeing a similar trend here in the Northeast Federal Milk Marketing Order 1. Over the last 20 years there's been an increase in overall butterfat component price (Figure 1) or the increase in fat value, and also an increase in the fat percent coming from the farm (Figure 2). This serves a basic rule of economics: As you increase price, an increase in supply will shortly follow.

Having more milk fat around isn't just an interesting trend, it's extremely influential in determining the Class III milk price and mail box price. Class III milk is a "bundle" of the butterfat price, the protein price, and other solids price. Here in the Northeast Milk Marketing Order, we're lucky to have a slight majority of milk receipts coming from Class I at 29.1%. But the next largest class supplied here is Class III at 27.2% of total milk receipts. Class III milk is also very important in determining the Statistical Uniform Price which determines the value of a hundred weight (cwt) across a federal order. The Statistical Uniform Price can also be called the "Total Blend Price" and is the Class III price added to the producer price differential which varies based on location to Boston, MA. For July 2019, the Class III price was \$17.55. If you were a farmer that shipped to Syracuse, NY, your producer price differential would be \$0.53. Adding the Class III price of \$17.55 to the producer price differential of \$0.53, the value of milk at 3.5% fat for that producer in Syracuse is \$18.03/cwt (without any other cooperative deductions or quality bonuses). The producer price differentials will change based on the location your milk is shipped to.

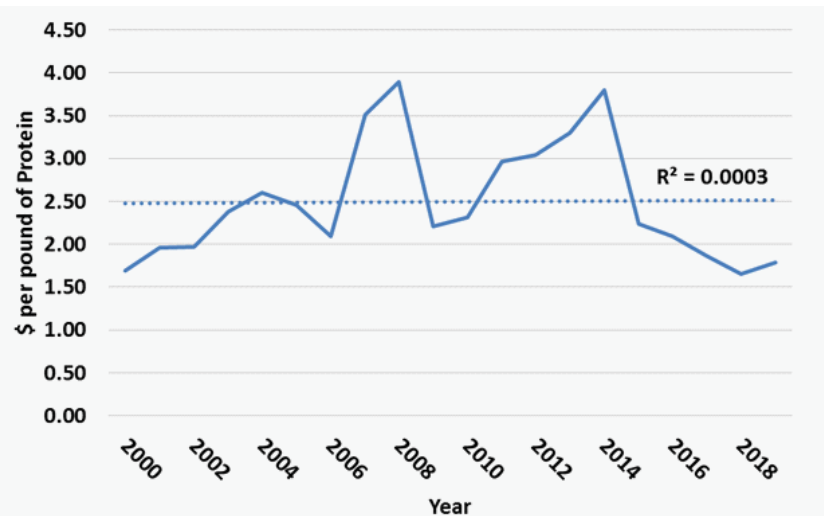
See **MILK CHECK**, Page 7



**Figure 1** Average butterfat test of producer receipts Northeast Federal Milk Marketing Order 1



**Figure 2** Average price per pound of butterfat in Northeast Federal Milk Marketing Order 1



**Figure 3** Average price per pound of protein in Northeast Federal Milk Marketing Order 1



# “STAPH” MEETING: A DIFFERENT APPROACH TO COMBATING MASTITIS?

The numbers don't lie- mastitis infections in dairy herds are one of the most financially detrimental occurrences that a producer can face. With an estimated \$2 billion in losses each year in the US and \$400 million in Canada, more preventative and sustainable measures to alleviate mastitis infections are sorely needed. Staphylococcus aureus still remains one of the most prevalent causes of contagious mastitis as it proliferates quickly, is prone to resurgence, and due to its ability to often evade immune responses and develop resistance to antimicrobials, is difficult to eliminate from herds. A study of Finnish dairy cattle found that cows infected with S. aureus mastitis experienced a loss of roughly 5 lb milk/day. Management strategies (such as segregation and culling of infected animals), cleanliness and efficient treatment upon identification have helped dairies to better combat staphylococcal mastitis infections, but control and eradication in herds remains a struggle.

The use of purified surface protein vaccines is not a novel area of research, but new applications are being explored as a means to improve mastitis treatments. Surface proteins are located in the bacterial cell wall, and determine how the cell interacts with

its environment, especially with regard to immune response. By removing virulence factors (the disease-inducing mechanisms) from foreign antigens, the surface proteins can be used to mimic a natural infection and spur an immune response in the host. Antigenic similarities between two different strains of bacteria can result in one exhibiting cross-protective effects against another, which has captured the attention of researchers in the quest to find vaccine development strategies that are cost-effective and sustainable. Research from the University of Tennessee in a recent volume of Veterinary Immunology and Immunopathology evaluated the protective effects of Staphylococcus chromogenes (a common causative agent of subclinical mastitis) against Staphylococcus aureus infection. Results from the study showed that not only did inoculating cows with a S. chromogenes surface protein result in a protective immune response, but the presence of S. chromogenes also prevented intramammary colonization of S. aureus. Current mastitis vaccines on the market create antibodies against staphylococcal infections, but do not prevent new infection. Wouldn't it be great if staphylococcal bacteria could use their powers for good, rather than for evil? While this study was not without its limitations, and the exact

mechanism of immune response and antibody production is not yet known, opportunities exist to conduct further study and broaden this avenue of research.

With the push to reduce antimicrobial use on farms (such as in the practice of the prophylactic treatments administered at dry-off), development of more treatments of this nature shows promise as a potential method of eliminating resurgent infections in herds. While currently the most effective means of treatment, especially for infections caused by Gram-positive organisms such as S. aureus, intramammary therapy for clinical and subclinical mastitis accounts for the greatest amount of all drug use on dairy farms. Development of a vaccine that reduces the need to turn to blanket prophylaxis or antimicrobial therapies would invoke a realm of possibilities for improving herd health, as well as mitigating withholding times and amount of discarded milk. It would be interesting to see the application of such a vaccine in youngstock or transition cows to evaluate protective effect in stages of sensitive immunity. This is one “staph” meeting we should be looking forward to hearing more about.

— Cari Reynolds  
reynolds@whminer.com



**Farmer-Driven Research • Real-World Results**

[www.nnyagdev.org](http://www.nnyagdev.org)

NNY research results/reports/news for farmers  
in Clinton, Essex, Franklin, Jefferson, Lewis  
& St. Lawrence Counties

**Practical Applications for**  
**Dairy • Field Crops • Horticulture • Maple & More**

To request updates by text or email: contact 315-465-7578

NNYADP funding is supported by the New York State Senate and administered by NYS Dept. of Agriculture & Markets

# BEST PRACTICES FOR MANURE MANAGEMENT

As fall has arrived and the time to empty manure pits in preparation for winter storage is nearly upon us, there's no better time to think about manure management strategies. Research has demonstrated that there is a greater risk for phosphorus (P) and nitrogen (N) loss when manure is applied to fields in the fall rather than the spring. Therefore, while time can be short during the fall harvest season, it's especially important to follow best practices.

This is particularly true in the Northeast where more than half of annual precipitation can occur during the nongrowing season. This precipitation, combined with limited water uptake by plants, low rates of evaporation, and extended periods of frozen soils, leads to a higher rate of both surface runoff and tile drainage during fall, winter, and early spring. Research at Miner Institute has found that approximately three-quarters of annual runoff occurs between November 1 and April 30. Not only is the risk of runoff greater, but there will be a long delay between when the manure is applied and plants will once again require those nutrients.

Cover crops can help bridge this gap by sequestering fall-applied nutrients during the nongrowing season, but another key to nutrient retention is incorporating the manure into the soil. This can significantly reduce N volatilization losses to the atmosphere. Perhaps more importantly, greater manure-soil contact increases the amount of P bound to the soil, resulting in a lower risk of transport in subsequent runoff (especially as dissolved, bioavailable P). This can be accomplished by injecting the manure,

but in the absence of manure injection equipment, tilling in a broadcast manure application can achieve the same objective.

A recent two-year study in Wisconsin found additional benefits from tillage following late fall/early winter applications of liquid dairy manure. Research plots were managed either as no-till or fall chisel plowed with a spring soil finisher. The researchers surface-applied manure (4,000 gal/A) to the plots following fall corn harvest for silage and then either incorporated the manure with a chisel plow or left it on the surface. The study also looked at how the timing of manure applications impacted nutrient losses (no manure, December, or January applications).

Regardless of the timing of the manure application, the tilled plots experienced fewer surface runoff events and less total surface runoff than plots that didn't receive tillage. This may sound somewhat counterintuitive, as one benefit of no-till can be greater infiltration rates due to a more extensive network of macropores. However, the ground was frozen for significant periods during the nongrowing season, reducing much of the impact that differences in soil structure between treatments may have imparted.

The decrease in surface runoff from the tilled plots had a significant impact on the level of nutrient export relative to the no-till plots. The no-till plots lost 200 times more P in the first year and a more moderate 3.4 times more P in the second year compared to the tilled plots. Additionally, they found that early or late winter applications mattered less than whether the soil

was frozen at the time of application. Applying manure to frozen soils, regardless of tillage treatment, resulted in greater nutrient loss because the manure had no opportunity to infiltrate and interact with the soil.

The researchers attributed the reductions in surface runoff and P loss to the much greater surface roughness in the tilled plots compared to the relatively smooth surface in the no-till plots. This can be especially important during the winter months, when a frost layer in the surface soils prevents water from immediately infiltrating the soil and increases the risk of surface runoff events. Due to the surface roughness in the tilled plots, there was greater opportunity for water to pond and ultimately infiltrate the soil or evaporate, rather than leaving as runoff. In contrast, there was minimal opportunity for surface ponding in the no-till plots, leading to much more immediate runoff down the plot slope (5.8% slope). The drastic reduction in P loss during the first year in the tilled plots occurred because there was only one runoff event, as opposed to nine events in the no-till plots.

The results of this study reinforce the need to incorporate surface-applied manure to decrease the risk of offsite P transport. For those who work in a no-till system, it's an important reminder that leaving manure on the field surface poses a significant risk for nutrient loss. Investigate the different methods of manure injection that will increase the manure-soil interactions to help minimize nutrient losses from the field, while maintaining the soil health benefits of your no-till system.

— *Laura Klaiber*  
*klaiber@whminer.com*

# DAIRY DAY AT MINER INSTITUTE

## Wednesday, Dec. 11, 2019

Join us for a full day at Miner Institute!  
Speaker program is from 10 am - 3 pm.

### Speakers include:

Dr. Rick Grant, Dr. Sarah Morrison, Katie Ballard, and Dr. Heather Dann from Miner Institute speaking on a variety of topics ranging from feeding management to heat stress, forage digestibility, and calves.

This will be followed later in the afternoon with a tour of our dairy barn and research area with a chance to view our new addition currently under construction.

Dinner will be available from 5-6 pm.

Please call Wanda at 518-846-7121, ext. 117, to let us know you plan to participate in dinner.

After dinner you are encouraged to join us for the Cornell Feed Dealer Meeting with Dr. Tom Overton and Dr. Kristan Reed from 6-9 pm.

---

## INVESTMENTS VS. EXPENSES

Higher milk prices are (finally!) resulting in more dairy farms running in the black. However, the joy of a bigger milk check is being dampened by a very rough crop year. This may be a good time to consider an investment in subsurface (tile) drainage. (We still tend to call it “tile” drainage even though today’s installations use corrugated polyethylene tubing.) Drainage is an investment in your farm’s future profitability because a properly installed subsurface drain system should last for generations. Once a farmer has installed subsurface drainage in one field, other fields often follow. Why? Because these systems increase forage yield and quality during both wet years and dry years.

It’s not too late to consider drainage in 2019. Modern drain plows can work in a wide range of conditions, including fields with a fairly thick crust of frost. Many years ago Miner Institute had a very wet field tile drained via drain plow in December after the ground had frozen. (It was too wet to drain before then.) The surface was frozen, but as soon as the tubing was installed the outlet started running a stream of water. Nuff said.

— E.T.



# A FOURTH “MAJOR NUTRIENT”?

On January 1st all commercial ocean-going ships will be required to either use low-sulfur fuel or to install “scrubbers” on their engines that will remove sulfur from exhaust. These new requirements are part of a long-term global effort to reduce sulfur dioxide emissions, the latest in a series of regulations that have reduced sulfur depositions from precipitation to a small fraction of what they were 30 years ago when we’d frequently read of the damage caused by acid rain. Sulfur depositions in the Midwest and the Northeast are now about 85% lower than they were in 1990.

This is great for air quality but is having an impact on farm fertilizer

programs, one that almost certainly will become more pronounced. Sulfur isn’t a micronutrient; along with magnesium it’s been considered a “secondary” nutrient. However, some crops use more sulfur than they do phosphorus, so with reduced emissions sulfur is becoming the fourth major nutrient along with nitrogen, phosphorus and potassium. Even before this latest regulation, cropland across the U.S. has been getting barely 1 pound of sulfur per acre from precipitation while crop removal of sulfur ranges from 10 to 30 lbs./acre. Is it any wonder why agronomists are increasingly finding yield responses from sulfur, fertilizers particularly in alfalfa production? This shouldn’t

be news to long-time readers of the Farm Report since we’ve previously noted the increasing need for sulfur to replace what we used to get “for free” via precipitation. Fortunately, there are good, inexpensive sources of sulfur fertilizer. Start with a review your forage analyses since they can be an early-warning system for sulfur deficiencies, but a better alternative is tissue analysis since this involves specific plant parts and stages of growth to provide a more accurate indication of plant sulfur status. Regularly manured fields are less likely to have sulfur deficiencies than fields that are a “fur piece” from the farmstead.

—E.T.

## NOBODY ASKED MY OPINION, BUT...

- ... why is the guy’s responsibility to put the toilet seat down? Why can’t the previous user — regardless of gender — leave the seat in the “up” position?
- ...speaking of which, as I’ve grown older I have a better understanding of the meaning of the term “wee hours”.

## MILK CHECK, Continued from Page 3

As any dairy farmer knows, if you can increase the fat percent in your own bulk tank, you increase the total pounds of 3.5% milk fat, increasing your revenue. The same idea works for increasing the protein percent in milk, but at the moment, protein really doesn’t have the same consistently high value that fat has had over the past decade (Figure 3). The Class III prices are increasing (Figure 4) as the value of milk fat is rapidly increasing and the value of protein has remained stagnant. Even with the static value of protein, Northeast farmers have slowly increased the protein shipped off farm, but not to the extent in which we have increased milk fat. So at this time, fat remains the driver for your Class III prices and the milk price dairy farmers should be monitoring. There are many management tools that are being developed to better manage fat. Ask your nutritionist or milk co-op if there are tools available for your farm to better manage milk fat.

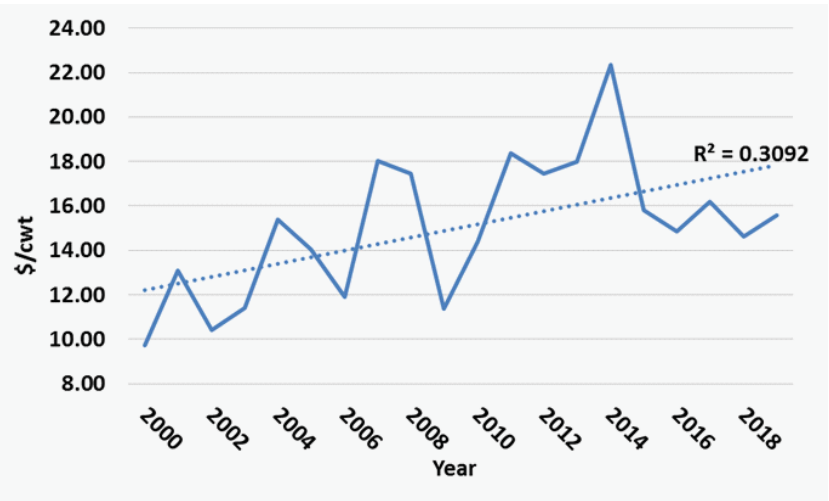


Figure 4 Class III Milk Price for milk containing 3.5% butterfat in Northeast Federal Milk Marketing Order 1

— Kristen Gallagher  
gallagher@whminer.com





## YOUR OCTOBER FARM REPORT IS HERE ENJOY!



Miner Institute's 2019 charity kickball team. Back Row L to R: Adam LaCount, Lisa Klaiber, Ashton Nelson, Jared Ashline, ShyAnne Koehler, Mark Haney. Front row L to R: Bruno Franco, Dan Belrose, Sarah Morrison, Laura Klaiber. The team played in a tournament on Sept. 28 that raised \$3000 for local charities.

### *Closing Comment*

Google must be a woman because it won't let you finish your sentence without coming up with other suggestions.

[www.whminer.org](http://www.whminer.org)

518.846.7121 Office  
518.846.8445 Fax