FARM REPORT

FROM THE PRESIDENT'S DESK: RAMBLINGS ON WELFARE & WORLD RECORD HOLDERS

A recent review of the 100-year history of the Journal of Dairy Science found that the first use of the phrase "animal welfare" in the Journal wasn't until 1983, sixty-six years after its founding. That article was written by Dr. Jack Albright of Purdue University and is now considered a classic and still essential reading for any serious student of dairy cattle welfare (J. Dairy Sci. 66:2208). Jack Albright was a pioneer in dairy cattle behavior and management, publishing research on the subject decades before the mainstream dairy industry appreciated the importance of animal welfare.

I was putting together a lecture on time budgets and cow comfort for our Advanced Dairy Management students this semester at about the same time I read this 100-year review, and it made me think of one of the first studies of time budgeting in dairy cattle – conducted of course by Jack Albright. Monitoring time budgets to gauge the cow's environment is now commonplace, but not so in 1975. That was the year that the first cow broke 50,000 pounds of milk in one lactation – Beecher Arlinda Ellen – and Albright's team was on the Beecher farm in Rochester, IN to observe what behaviors made her so productive and hopefully decode what made her so special.

Albright noted that Ellen closed her eyes 30 minutes a day and chewed 60 times per minute. She would tip a water bucket to drink every last drop before moving to the full bucket sitting next to it. She rested about 14 hours a day and ruminated another 7.5 hours. An article in the Indianapolis Monthly noted that, above all, Ellen never appeared to be flustered.

Fast-forward to today and the current world record holder for milk production: Selz-Pralle Aftershock 3918 at Selz-Pralle Dairy near Humbird, WI who produced over 78,000 pounds of milk in 365 days. Again, this cow's behavioral time budget looms large when her owner noted that "she's either at the bunk or resting. She's always chewing her cud." And when asked to provide insight into how he managed his cows for high productivity, the response emphasized: be persnickety, listen to the cows and minimize their stress.

Persnickety is an uncommon word nowadays, on par with malarkey in popularity, but it fits perfectly. Webster's Dictionary defines persnickety as being fussy, picky, and particular about how things get done, even to the point of perhaps annoying your fellow man. But undoubtedly, persnickety attention to the behavioral needs of dairy cattle leads to high performing, healthy herds.

To return to the seminal 1983 publication by Jack Albright, he highlighted topics that he felt demanded research and solutions: confinement housing and concrete floors, proper stall design, overstocking, optimal group size, and ensuring cow comfort in various housing systems. Considerable research has focused on these topics in the last forty years, though much remains to be done. In a follow-up article written in 1987 (J. Dairy Sci. 70:2711),

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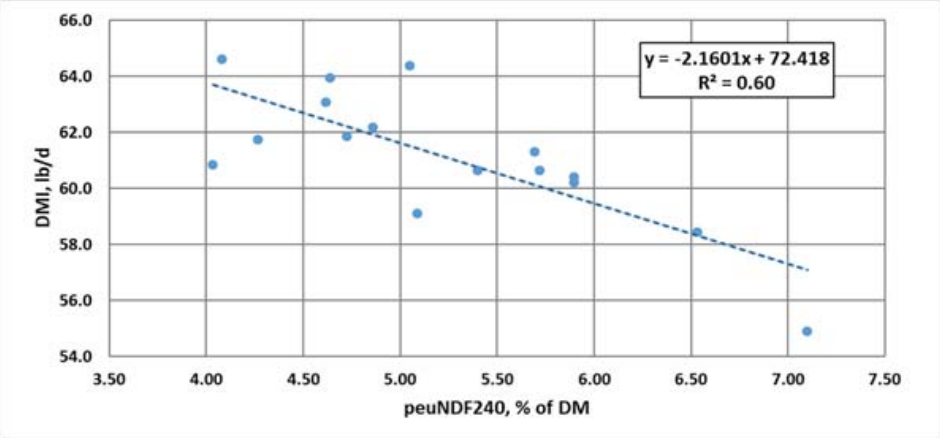
peuNDF240: THE MARRIAGE OF PARTICLE SIZE AND INDIGESTIBILITY

Forages are the foundation of most dairy cow diets and mainly provide fiber as the major nutrient. It is important to quantify not only the amount of fiber but also the digestibility and particle size. Quantity of fiber is measured by neutral detergent fiber (NDF) and is related to intake and chewing activity. The indigestible portion of the fiber is called undigested NDF (uNDF240) and is quantified by in vitro fermentation for 240 hours. Undigested NDF at 240 hours is related to physical effectiveness and gut fill. The particle size can be measured using a sieve system such as the Penn State Particle Separator (PSPS) and the proportion of particles above the 4.0-mm screen referred to as the physical effectiveness factor (pef). The pef then can be multiplied by total ration NDF to calculate a physically effective neutral detergent fiber (peNDF) and is the fiber that helps supports normal rumen function.



Relationship from five studies conducted at Miner Institute between dietary peuNDF240 and DMI and ECM yield for cows fed diets based on corn silage, haycrop silage, timothy hay, and chopped wheat straw.

These measures help nutritionists formulate diets that provide enough fiber for healthy rumen function but also supply enough energy to support high milk production. A relatively new measure we created at Miner Institute is physically effective undigested NDF at 240 hours (peuNDF240), which is calculated by multiplying the pef by total ration uNDF240. This measure has been related to physical effectiveness, gut fill, and chewing activity. In order to understand how peuNDF240 relates to dry matter intake (DMI) and energy corrected milk yield (ECM), we have built a database of studies conducted at the Institute. The database consists of 5 studies due to limited studies that have measured both pef and uNDF240. Diets contained corn silage, hay crop silage, chopped timothy hay, chopped wheat straw, and two diets contained substantial beet pulp. Figure 1 presents

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Albright noted that "very little organized U.S. research on dairy animal welfare is underway." The 100-year review of welfare publications in the Journal of Dairy Science (2017. J. Dairy Sci. 100:10432) concluded that the situation is similar today. The authors found that of the 9,190 publications led by U.S. researchers since 1983, only 0.7% focused on animal welfare.

So, I'm not sure where these ramblings have led. Unlike most of my Farm Report articles, there is no take-home practice or nutritional advice. But it may be enough to simply pause and think about the essential importance of understanding behavioral time budgets, the welfare research needing to be done, and the pioneering role of Dr. Jack Albright.

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THE BEST AVAILABLE INFORMATION

The 1965 Cornell Recommends for Field Crops included a table of the recommended seeding rates when grass is seeded with alfalfa. When seeded with 8-12 lbs./acre of alfalfa the recommended rate for grasses was 4-6 lbs/A. for timothy and orchardgrass and 5-8 lbs./A for bromegrass. Over half a century later Cornell's recommended alfalfa seeding rate hadn't changed, while the only changes in the grass seeding rates in the 2016 Cornell Recommends for Field Crops was to eliminate the range and recommend 4 lbs./A for timothy and orchardgrass, 8 lbs/A. for bromegrass. So essentially no changes in alfalfa-grass seeding rate recommendations in over 50 years.

Was this because Cornell University agronomists did research comparing several seeding rates and found that the current recommendations were correct? Nope, it's because there wasn't any new research! I worked for Cornell University Cooperative Extension from 1966 through 1981 and have kept in touch with the field crop staff since then, so if Cornell had done this research seems that I'd have heard about it. It wasn't until a "new" grass species, tall fescue, became popular that serious efforts were made to fine-tune alfalfa-grass seeding rates. Back in the "aughts" (early 2000s) Jerry Cherney did two alfalfa + tall fescue seeding rate studies in Cornell University's research area at Miner Institute, using 0.5, 1, 2. 4 and 8 lbs./acre of tall fescue. We therefore have some confidence that today's tall fescue seeding rates are based on current research.

Sometimes printed recommendations take time to catch up with current research results. That's why a Cornell University website, Forages.org, recommends 8 lbs./acre for tall fescue seeded with alfalfa while the 2020 Cornell Recommends for Field Crops recommends 3-4 lbs./acre for tall fescue. When seeded with alfalfa, meadow fescue seeding rates are even less — 1-3 lbs./acre in the Cornell Recommends while Cherney thinks that 1-2 lbs./acre of meadow fescue is enough.

While this may be confusing, the recommendations we make are based on the information we have at the time. I'm only half-kidding when I tell folks that crop consultants have guaranteed job security because as soon as we have a majority of our clientele headed in one direction, we change the route! And dairy nutrition consultants have no reason to laugh…

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OUR HAPPY PLACE

Being out and around working the land is a farmer's "happy place", and now there's scientific proof of it. A soil microbe, Mycobacterium vaccae, has been found to mirror the effect of neurons in the brain; this effect is similar to that of drugs such as Prozac but with none of the nasty side effects. M. vaccae causes cytokine levels to rise, leading to the production of serotonin — and serotonin makes us feel relaxed and happy. Conversely, a lack of serotonin has been linked to depression, anxiety, OCD and bipolar disorders. Laboratory tests have confirmed that this soil microbe results in less stress and better concentration, and scientists have found no adverse effects of any kind. It's also being studied for possible health benefits related to Crohn's disease and arthritis.

Farmers are in frequent contact with M. vaccae by getting soil on their hands and other body parts, by inhaling dust from cropland, and by getting it into their bloodstreams via the nicks and cuts that are a regular part of life on the farm. The old suggestion "Rub some dirt on it" following a small injury might just turn out to be excellent medical advice.

— E.T.

WHAT'S HAPPENING ON THE FARM?

As I write this article, the country is two weeks into the COVID-19 pandemic. Everything at the Miner Institute campus, as with the rest of the North Country or for that matter the entire world has come to a screeching halt. All non-essential employees are working from home and the Advanced Dairy Management students have packed up their dormitory rooms and have left for home to be with their families in these uncertain times. The world feels like it's standing still, but like thousands of other dairies across the United States, the lights come on and the cows still get milked two to three times per day. With that being said, I'd like to share a little bit about my coworkers who help keep the Miner Institute Dairy moving forward while the rest of the world has come to a standstill. In the May *Farm Report,* I'll write a follow-up article to "The Cost of Mastitis to the Dairy Industry" by looking at services and procedures dairies can implement to prevent costly mastitis and produce the highest quality milk possible.

When this *Farm Report* hits your kitchen table I'll have been employed as the herd health manager of the Miner Institute Dairy for just shy of six months. It's truly been a learning experience, and I've developed the upmost respect for the men and women who keep the dairy industry running on a day-to-day basis producing the highest-quality milk. It takes a "TEAM" of men and women to run a successful dairy operation, and there is definitely no "I" in "TEAM". "I" would like to take this opportunity to share a little bit about the "TEAM" with whom I work with on a daily basis.

As spring weather appears to be coming on strong, Shawn Bechard and the crops crew are busy getting the equipment ready for spring corn planting and first cut of haylage. Shawn's goals are to have corn seed in the ground no later than the middle to the end of May and first cut of grass haylage off the fields by no later the end of the first week of June. Obviously, these goals are very much weather-dependent, but Shawn has acquired two pieces of equipment to add to his arsenal to help his crew reach these yearly goals. The first is a new John Deere 8700 self-propelled chopper to replace our old John Deere 7300. This increase in horsepower will greatly assist Shawn and his crew in harvesting both hay and corn in a timely manner to maximize forage quality. The second piece of equipment, a Kinze 12-row corn planter, was purchased to replace the old John Deere 6-row corn planter. The new Kinze will definitely help Shawn and his crew meet the goal of corn seed in the ground by the end of May. As with any dairy, the largest yearly expense is feed cost. One sure way to reduce overall feed costs on a dairy is to put up the highest quality forages possible to reduce the number of purchased feedstuffs.

Bethann Buskey and her crew are doing an outstanding job managing our dairy replacement heifers. In fact, the dairies mortality rate across all stages of heifer development through 2019 was well below 1%. In order to achieve these high standards, all heifer calves are fed one gallon of colostrum with a Brix reading of 22% or higher in the first 2 hours of life, and a second gallon within the first 12 hours of life. For the third and fourth feedings heifer calves receive one gallon of pasteurized transition milk prior to being moved to the calf hutches. Bethann along with Erik Whittaker, nutritionist for Poulin Grain, have formulated a calf feeding protocol at which the heifer calves' average daily rate of gain of 2.0 - 2.5 pounds. This rate of gain is maintained through the post weaning period as well by feeding those high-quality forages produced on the dairy. This high rate of gain through the heifer's early development stages allows us to meet or exceed the dairy industry standards (Penn State Extension) of breeding dairy replacement heifers for the first time at 55% mature body weight and 90% of mature structural growth by the breeding age of 13-15 months of age. This puts the age at first calving at 22-24 months of age to help meet ideal lifetime milk production.

Shaun Castine and the milking crew are doing an excellent job harvesting quality milk from our cows. As I mentioned in the January *Farm Report* our biggest disease challenge at the dairy is clinical environmental mastitis. Although our bulk tank Somatic Cell Count (SCC) has never been above 200,000 (as calculated by Agri-Mark), our monthly average herd bulk tank SCC has steadily risen since May 2019, and is currently higher than our short- and long-term goals. My overreaching goals for the herd in the short-term is a SCC of less than 120,000 and long-term goal of less than 100,000. In the May *Farm Report* I'll discuss at greater lengths how we intend on meeting or exceeding these SCC goals.

The daily milk production for most of 2019 averaged over 100 pounds per cow, but in recent months daily milk production has dropped slightly below 100 pounds per cow. Some things I believe have contributed to this drop are the rise in herd SCC, subclinical and clinical milk fevers in our fresh cows, and switching to 2019 corn silage. Erik Whittaker has worked closely with Ralph Labombard, lead feeder, and Steve Couture, farm manager, to adjust the diets accordingly to accommodate for the changes in the forages. In early February, Erik removed the anionic salts from the pre-fresh diet and replaced them with a calcium binder, X Zelit, to address the subclinical and

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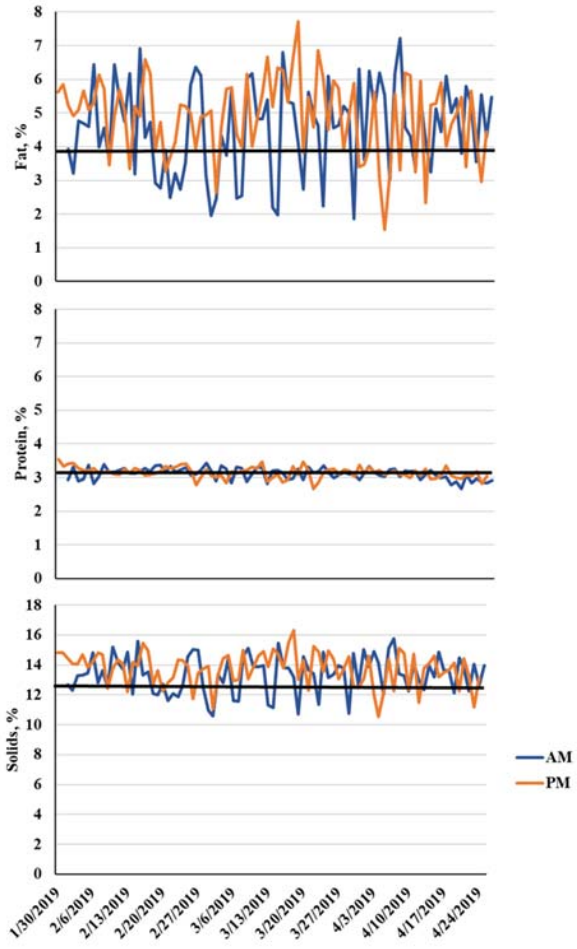
MILK COMPOSITION VARIABILITY IN CALF FEEDING

Last winter we conducted a study on winter feeding management on area farms. One of the farms fed whole milk to their calves and we collected a sample of milk at each feeding to represent what was offered to the calves. Samples were collected from the end of January until April. Some of the milk component analyses are shown in the figures and include fat, protein, and solid percentage. The blue line is the samples collected in the morning and the orange line is the samples collected in the evening. In each figure, the black line represents an expected composition based on what typically would be observed for Holstein bulk tank values. In this case the expected composition was set at 3.8% fat, 3.1% protein, and 12.5% solids.



For fat percentage, the overall average for the AM feeding was 4.55% while the PM feeding averaged 4.92%. There was a range of 1.54 to 7.71% fat over the time in which samples were collected. For protein percentage, the overall average for the AM feeding was 3.11% while the PM feeding averaged 3.16%. There was a range of 2.67 to 3.55% protein. For solid percentage, the overall average for the AM feeding was 13.35% while the PM feeding averaged 13.75%. There was a range of 10.52 to 16.29% solids. The widest range in milk composition was the fat and solids content, while protein had slightly less of a range in values.

Why does this variability in components matter? If a farm is feeding milk, that nutrient source is expected to provide a certain amount of nutrients to meet the requirement of the calf at a certain feeding rate. The nutrients provided will support the protein and energy requirements of the calf. In the winter, calves will be more limited in energy because of the increased requirements to maintain thermal regulation. However, growth and lean gain is driven by the amount of protein provided in the diet.

When feeding calves, we should formulate the milk program based on expected gain and maintenance requirements of the calf. To do this we would consider the amount of energy and protein provided through the liquid feeding program. If the expected bulk tank values are used to estimated the volume required to meet the requirements of the calf, deviations may lead to reduced growth of the calves.

During the time in which samples were collected on this farm 24% of samples were below 3.8% fat, 40% of samples were below 3.1% protein, and 22% of the samples were below 12.5% solids.

While protein appeared to have the smallest range in composition, the number of feedings below the expected 3.1% was the most at 40%. This means that protein could be limiting 40% of the time if the energy requirements of the calf had been met. Furthermore, approximately 25% of the time fat was below expected and could have been limiting to meet the requirements of the calf, especially under cold weather conditions.

The whole milk on this farm was collected from the line in the milking parlor before it was cooled and pooled all together in the bulk tank. Therefore, depending on the time in which the calf feeder was collecting milk there could be differences in what cows were contributing to the milk fed to calves (i.e. stage of lactation, treated vs. not treated etc.). To minimize the variation of whole milk fed to calves, if it is possible, would be to pull milk from a larger number of cows to minimize day to day or within day changes that individual cows may contribute.

Another way to help mitigate the variability in composition is the inclusion of a milk balancer. Milk balancers are designed to be added into whole milk to provide additional protein, and a small amount of energy. The addition of a milk balancer would help to add additional protein in the whole milk when it was low. With the addition of milk balancer, especially at a constant rate without consideration for milk with high solids content, water offered free choice should always be provided.

While it is clear that changes in composition can change day to day or even within day, tracking composition on a more regular basis could understand how variable the milk might be on your farm. One simple way to track this would be through the use of a Brix refractometer to estimate solid content.

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RESEARCH UPDATE: WATER QUALITY IN ALFALFA-GRASS RUNOFF PLOTS, PART 2

In last month's Farm Report I summarized the 2018-2019 runoff and phosphorus (P) data from Miner Institute's alfalfa-grass research plots. To summarize briefly, surface runoff and tile drain flows from four plots were continuously monitored and samples were collected and analyzed for sediment content, P, and nitrogen (N). The objective of this study funded by the Northern New York Agricultural Development Program is to understand how runoff, P and N forms, and sediment are partitioned between surface runoff and tile drainage.

Year	Pathway	Runoff	Nitrate-N Load	Nitrate-N FWM	Total N Load	Total N FWM
		inches	lb/ac	mg/L	lb/ac	mg/L
2018	Surface	2.30	**0.88**	**1.89**	**3.52**	**5.74**
2018	Tile	3.34	**28.66**	**37.39**	**31.30**	**40.65**
2018	Total	5.64	29.54	24.84	34.82	29.14
2019	Surface	**1.01**	**0.17**	**0.67**	**0.57**	**2.02**
2019	Tile	**10.19**	**28.30**	**11.14**	**30.32**	**11.97**
2019	Total	11.20	28.47	10.86	30.89	11.78

The plots were planted with an alfalfa-grass mixture in May 2018 following a five-year corn silage rotation. Liquid dairy manure was applied and incorporated in fall 2017 following corn harvest, no manure was applied in 2018, and broadcast applications were made in 2019 following first (July) and second (September) cuts. A more comprehensive discussion of management, weather conditions, and runoff dynamics can be found in the March article and will help inform the N data presented here.

Total N losses were driven by the nitrate-N losses in tile drainage in both 2018 and 2019. The tiles contributed 90% and 98% of total N losses in 2018 and 2019, respectively, with an average of 92% of the total N in tile flow occurring as nitrate-N. This is not surprising as nitrate-N is a soluble and highly mobile form of N and this mobility causes it to be the dominant form of N lost from tile-drained fields.

Better aerated soils are able to mineralize organic N stores in the soil into ammonium-N, which is then converted into nitrate-N by soil bacteria, at a higher rate than poorly drained soils. While nitrate-N is the dominant form of N used by growing crops, when fields are tiled and able to rapidly drain, this nitrate-N can be lost more quickly than plants can use it. This is particularly true on the fringes of the growing season and during the nongrowing season when runoff rates are high, but crop uptake is low or nonexistent.

Despite the much higher drainage volume in 2019, there was slightly higher total N export in 2018 (34.82 lb/ac) than in 2019 (30.89 lb/ac). This is reflected in the substantially higher total N flow-weighted mean (FWM) concentration for tile drainage in 2018 (40.65 mg/L) versus 2019 (11.97 mg/L). An annual FWM concentration is roughly analogous to the average concentration during the year for a given nutrient. As with the reduction in P losses, the combination of ground cover and manure management likely contributed to these reduced N losses in 2019. With an established stand in the fall and early spring, crop uptake can draw down residual soil N that was mineralized during the growing season and prevent those nutrients from being lost during the nongrowing season. Applying manure in coordination with crop growth (as was done in 2019) will also increase the likelihood of N being removed by the growing crop, thereby reducing the risk of loss in drainage.

Although the total N FWM concentrations were much lower in 2019, they were still at a level of concern and total exports remained elevated. These N losses represent a risk to water quality, as well as a financial opportunity for the farm. In both years, the tile drainage nitrate-N FWM concentrations were above the drinking water standard (10 mg/L) set by the EPA. From an economic perspective, retaining N in the soil can improve crop yields, particularly for first cut, or reduce the amount of commercial N that may be applied at green-up.

The high rates of N loss are likely related to the soil characteristics of the plots. The plots consist of a combination of a coarse-textured soil and a fine-textured, poorly drained soil. The coarse-textured soil is classified as excessively well-drained, and as previously discussed, transformation from organic N to mobile forms of N will occur much more rapidly in these types of soils. When tile drainage is installed in soils such as these, there is a very high risk of nitrate-N loss to surface waters as the tiles further enhance drainage and intercept and remove subsurface water before plants have a chance to utilize the plant available N in the water. The upslope area of the plots that primarily consists of this coarse-textured soil likely contributed the majority of the N load and these results demonstrate one reason why it is not recommended to install tile systems in naturally well-drained soils.

We are continuing this project in 2020. With limited freezing of the soils this winter, the tiles have consistently been active during rain and snowmelt events throughout the winter, similar to conditions in 2019. We are interested in seeing if N losses continue to decrease, or begin to stabilize, if P losses remain low, and whether the nongrowing season continues to be the dominant period of both P and N losses.

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BIOFILMS: THE SEQUEL

Over the course of the past few weeks, the world has been asked to do what introverts have been training for their entire lives: stay home and avoid people. I think it's safe to say that there's a lot of movies being watched as many try to adjust to a new routine. There are some movies where, if you get up to get a snack and miss one crucial part, it could ruin the rest of the movie for you. Biofilms are a lot like these movies; if one essential step in cleaning is missed, or a small, yet important piece is overlooked, your product or the health of an animal could be at risk. In my January article I discussed the impact of biofilms and their presence on the farm. This month, let's discuss a common biofilm-forming pathogen that can not only pose a threat to humans, but also to calves. Grab some popcorn and settle in for this newest feature.

Hard-to-clean places, scratched or gouged surfaces, or improper cleaning cycles can be some of the reasons that biofilms can develop. As a relatable example: if your travel coffee mug has a rubber gasket in the lid (as most do for insulation), have you ever actually looked closely at it, or the area where the gasket is seated? Unless you're separating it from the lid to clean it, that area is not getting cleaned properly, and over time, results in residue. There are a few specific places on-farm to keep an eye on to make sure they are being properly cleaned. Places in piping where water, product or detergent is not adequately flushed out or where liquid is allowed to pool are opportunities for biofilm production. These are colloquially called "dead legs", as they're often a closed-off auxiliary pipe end with not enough slope or an area to allow for recirculation or drainage. Take some time to examine your piping systems to your bulk tank or from the parlor to see if you have any such areas, and contact your milking system manufacturer to evaluate any potential issues. Another location is milking equipment itself; rubber teat cup liners are a very likely culprit, as well as milk meters and milking lines. These should be regularly monitored, cleaned and replaced as per the manufacturer's recommendations. Think about all of the areas in your milking equipment where there are rubber seals, gaskets and any other relatively porous surfaces, whose crevices provide an ideal location for organic material collection. And, of course, scratches and gouges in plastic equipment and stainless steel remain the prime suspect. Keeping an eye on these places, as well as frequent maintenance and checks, can help you keep ahead of issues.

Listeria monocytogenes is not only a pathogen of clinical importance in food safety, but also one that can present a threat to young calves. A Journal of Dairy Science study found that Listeria presence in one farm's bulk tank milk was likely caused from biofilm presence on milk meters, in-line milk filters, rubber liners, and milking lines. Samples were acquired directly from milking equipment post-CIP and sanitation for evaluation. Visible biofilms were present on several of the milk meters, and surface scratches on the meters were harboring considerable bacterial presence. Upon further investigation, it was also determined that the temperature of the water and cleaning solutions in the pipeline and bulk tank wash cycles were far below those recommended by the manufacturer: 53°C (127°F) vs the recommended 73°C (163°F), which resulted in inadequate removal of milk residue. L. monocytogenes isolates were obtained from milk meters, rubber teat cup liners, and a bulk tank outlet and persisted over a 9-month period, which suggests the presence of biofilms numerous enough to distribute bacteria back into the product. As Listeria is able to thrive in colder temperatures, a bulk tank is ideal for its proliferation. Contaminated raw milk also results in persistent issues for processing plants, and is a frequent source of foodborne illness outbreaks due to its multiple reservoirs in the environment and gastrointestinal tracts of numerous species.

Presence of Listeria in milking equipment from biofilms, or buildup of organic material in teat cups or milking lines increases the risk of introducing Listeria to the newborn calf via colostrum and unpasteurized milk. In addition to increasing inhibition of immunoglobulin absorption, the threat of septicemia or enteritis as a result of listeriosis also looms. While overall risk for listeriosis in preweaned calves is relatively low, for calves that do contract listeriosis and survive, high morbidity rates are associated with intestinal damage from enteritis. A damaged intestinal tract jeopardizes the calf's immune health as well as their growth and development into a replacement heifer. To solidify the point that cleanliness matters, results from another study found that colostrum samples collected directly from a dam's udder had significantly lower bacterial contamination than samples that were collected after the dam was milked into a collection pail. Anything that milk or colostrum contacts should be cleaned in a consistent manner, and the number of containers used for colostrum collection should be minimized to reduce biofilm exposure. Here, an ounce of prevention in ensuring cleanliness in milking equipment is more than worth a pound of cure.

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APRIL IS PRIME TIME FOR FERTILIZING GRASSES

Whether grass production is profitable for your farm in 2020 may depend to a great extent on your applying nitrogen fertilizer or manure to the crop. Earlier is better — just as the grass breaks dormancy is ideal. My preference in early spring is a 50-50 or 75-25 blend of urea + ammonium sulfate at a rate of 200-300 lbs./acre depending on the yield potential of the stand. Higher yield potential = higher N rate. UAN solution is also A-OK at about the same rate. My preference would be urea-ammonium sulfate if the field hasn't been manured in the past year because of the sulfur in this blend. Use urea treated with an anti-volatilization product since this will considerably reduce N losses from urea.

— *E.T.*

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clinical milk fevers. The thought process behind a calcium binder is to minimize the amount of calcium absorbed from the cows digestive system which in turn triggers the cow's physiological systems to pull calcium from storage in her bones to maintain a serum calcium level of 8.0 mg/dl or greater. Thus far the change has shown good results as mature cow serum calcium levels within hours post calving have averaged 8.0 to 8.5 mg/dl, and zero cases of clinical milk fever.

There are three things we are looking forward to: First and most importantly, we all hope by the time the April edition of the *Farm Report* is published, the current state of the COVID-19 pandemic is past us and the country returns to some sense of normalcy. Assuming the current conditions do improve, we await the arrival of the summer interns in farm management, agricultural research, water quality research, and equine management. Last but not least is the completion of the research barn extension which is currently slated for June of 2020.

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PARTICLE SIZE, Continued from Page 2

the relationships between peuNDF240 with DMI and ECM using the 5-study database. Based on these graphs, peuNDF240 is highly related to DMI and ECM based on these type of diets. This is most likely due to peuNDF240 accounting for particle size and indigestible fiber in one measure.

Physically effective uNDF240 has a lot of promise for helping to understand the rumen kinetics of fiber. Although it is important to restrict these inferences to similar diets (corn silage with hay and fibrous byproducts) and there is a need for more research to understand better peuNDF240 relationship with DMI and ECM in a wider range of diets such as legume-based ones. As our knowledge of fiber measures continues to evolve, it will help us to formulate diets that maintain a healthy rumen and high milk production for the modern dairy cow.

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Best wishes and stay safe!

Closing Comment

Intelligence is like underwear: Good to have it but not necessary to show it off.

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