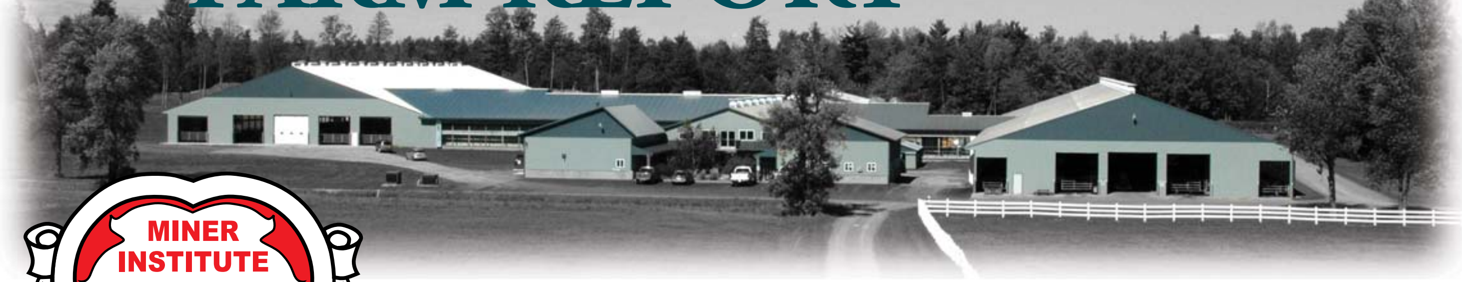
The William H. Miner Agricultural Research Institute August 2017

FARM REPORT



In This Issue:

Visit our blog: minermatters.com

Like us on Facebook

facebook.com/WhMinerInstitute

FROM THE PRESIDENT'S DESK: HIGH UNDF FORAGES ON THE WAY?

All summer long the rain hasn't stopped, and now it's getting warmer too. A perfect combination to boost lignification and undigested NDF (uNDF). It's increasingly likely that we'll be feeding some significant amount of poorly digestible forage fiber this winter, and we need to start thinking about how to best do it. Although a relatively new tool, we need to make best use of the uNDF values that are now a fairly standard part of many farms' forage analysis.

Indigestible NDF is highly lignified and the ratio of iNDF (measured as uNDF240om) to lignin is highly variable. The uNDF240om measure is more sensitive to growing environment, plant genetics, and maturity at harvest than simply lignin/NDF or (lignin x 2.4)/NDF. Indigestible NDF is sensitive to these three factors due to variable lignification and crosslinking of lignin and phenolic acids to hemicellulose. Recent work at Miner Institute and Cornell University shows that ester-linked paracoumaric acid and ether-linked ferulic acid reduce NDF digestion and are found in lower concentrations with bmr corn hybrids and lower quality grasses. In fact, the negative relationship between ether-linked ferulic acid content of fiber residues and in vivo dry matter digestibility reflects the existence of cross-linking from lignin to hemicellulose that inhibits NDF digestion. The nature and extent of these cross-links are associated with a specific hybrid, its maturity at harvest, and its interaction with the growing environment.

This makes uNDF240om highly useful for forage quality assessment and benchmarking. To date, feedback from the field has been positive on the utility of uNDF240om as an accurate and sensitive indicator of expected dry matter intake. Feed companies have begun to report the forage uNDFom at 30, 120, and 240 hours along with the mean and range so that a farmer or nutritionist may easily benchmark their forage against a larger population and anticipate whether dry matter intake will move up or down as cows are fed various inventories of forage.

Measured ranges in uNDF240om content for the major forage categories are continuously summarized and reported by forage testing laboratories. Here are the ranges that were reported by Dairy One Lab in their May 2015 newsletter:

- Corn silage uNDF240om: 8.7% of DM; Range: 2.0 to 25.5% of DM

- Legume silage uNDF240om: 17.6% of DM; Range: 5.5 to 31.7% of DM

- Grass silage uNDF240om: 15.5% of DM; Range: 2.3 to 44.8% of DM

See **FORAGE**, Page 6

A TROPICAL VACATION FOR DRY COWS IS COSTLY

We often refer to a cow's dry period as her hard-earned vacation time which makes it easy to forget that she is still performing a considerable amount of work. The late gestation period is critical for fetal growth, with the fetus gaining approximately 60% of its birthweight during the last two months of gestation. In addition, extensive growth of the mammary gland and cell turnover take place during this time, influencing future milk production. Even under the best conditions, our dry cows are experiencing physiological challenges during gestation and through their transition period, which are made considerably more challenging with the addition of heat stress.

When it comes to heat stress, a vast majority of the attention is paid to lactating cows, likely because of the immense amount of heat they generate, and the ease in quantifying the economic impact of the change in feed intake and milk production. Unfortunately, when a dry cow experiences heat stress, most of the effects aren't noticed until after calving. Although the dry cow produces less metabolic heat and has a higher heat dissipation capacity than a lactating cow, her endocrine system is more sensitive to moderate heat stress than a lactating cow. A review article done by Tao and Dahl in 2013 found that heat stress has profound effects on cows during the pre- and postpartum period. Relative to cooled cows, cows that experience heat stress during late gestation have impaired mammary growth prior to parturition, resulting in decreased milk production in the subsequent lactation.

I understand that it is one thing to know that your dry cows should be cooled, and another thing to be able to afford the cooling systems. However, according to a recent economic analysis performed by Ferreira et al. (2016) you really can't afford to not cool your dry cows. Their goal was to quantify the economic losses due to heat stress if dry cows are not cooled and to evaluate the economic feasibility of dry cow cooling. They found that the average U.S. dairy cow without access to a cooling system experiences 96 heat stress days during the year and loses 985 lbs of milk in her subsequent lactation. They calculated that for New York, if a dry cow is not cooled then the average milk loss in the subsequent lactation would be 853 lbs and the reduced profit/cow/year would be $75. By calculating the purchase of fans and sprinklers for a dry cow barn, and accounting for the use of water and electricity, they were able to determine that cooling of dry cows was very profitable everywhere except for Alaska.

This economic analysis included the effects of heat stress on only milk production in the subsequent lactation. There are many other negative effects of heat stress during late gestation to consider as well, such as compromised immune status of the transition cow, compromised fetal health and development, and potentially compromised post-natal growth of offspring. Implementing heat abatement systems is a great way to improve dry cow performance. If we truly want our dry cows to consider their dry period a vacation, we need to make sure they are as comfortable as possible.

— *Ashley Cate*
cate@whminer.com

A VERY WET DAY

Can you imagine what it's like to watch the water level in your rain gauge approach the top and it's still raining? That's what happened at Oak Point on Monday, July 24. A series of severe thunderstorms started moving through about 3 AM and the rain continued almost unabated for the rest of the day. I emptied our rain gauge when it reached 5" at 6:30 AM, then watched as it collected another 2.9". According to official weather records, the 7.9" of rain broke the estimated 500-year record for a 24-hour period in St. Lawrence County. "Estimated" because nobody had rain gauges in the 1500s.

— *E.T.*

MANAGING CORN AND SOYBEANS IN A DIFFICULT YEAR

MOTHER SAID THERE'D BE DAYS LIKE THIS…

…but she didn't say anything about entire growing seasons when things go off the tracks early and never quite get back on track. That about summarizes the 2017 crop year to date, and the date is getting late. According to Cornell University forage agronomist Jerry Cherney, "Growth this year for both alfalfa and grass would qualify as weird." Over 50% of corn in the region was planted in June, and this doesn't include that which wasn't planted at all. I'm not worried about full-season hybrids planted in late May, and only slightly concerned about corn a week or so earlier in Relative Maturity that was planted up to mid-June. But some farmers probably didn't heed our suggestion (imagine that!) to switch to earlier-maturity hybrids when the calendar page flipped from May to June so are now stuck with long-season hybrids in a short-season year. Unless a killing frost holds off well into October I'm afraid there will be a lot of "corn slush" ensiled this fall.

A common recommendation in a season like this one is that farmers should wait for frost to remove some moisture from immature corn. This is OK to a point, but the ears on immature (milk stage through early dent) corn are tightly wrapped by their husks. The combination of highly available sugars in milk-stage kernels and a tight husk cover is a recipe for mold formation soon after frost. If possible don't let frost kill more corn than you can get chopped in a week. The leaves on a corn plant at the recommended stage of maturity (33-35% DM) are typically about 14% of total dry matter and only a few % points higher at the milk stage. Therefore don't expect freeze-dried leaves to significantly increase plant dry matter %. Frost will have no impact on the dry matter content of the ear or the bottom 80% or so of the stalk. Frost should increase whole plant DM% by a couple of points, but don't expect miracles.

This weird growing season has done nothing to alter the "silk to silage in seven weeks" rule of thumb. Look carefully at your corn fields and note the calendar date when they begin to silk. You may not like what you find and there's always the chance of a warm late summer/early fall and delayed killing frost, but it's wise to be prepared.

Even if your corn crop is in trouble about you should still plan on using a silage inoculant, for two reasons: First, by the time you harvest this fall, frost and even periods of cold weather will probably have depleted the natural population of fermentation bacteria on the plants. Using a research-proven silage inoculant will ensure a sufficient population of "good" fermentation bacteria. Second, the fermentation of immature corn silage can become dominated by "wild" acetic acid-forming bacteria, assuming they've survived fall frosts. A little acetic acid is good — it's what gives silage that "tang" and tickles the hairs in your nostrils — but a lot of acetic acid can result in adverse fermentation and the resulting high spoilage losses.

— *Ev Thomas*
ethomas@oakpointny.com

LATE-PLANTED SOYBEANS

Corn wasn't the only field crop planted later than desired this year; much more of the soybean crop was planted in June than normal, and with the tremendous increase in soybean acreage in N.Y. and the North Country, there are a lot of very late soybeans out there. Soybeans are also love sun and heat, something that was notably missing even into July.

"Will my soybeans make it?" With typical May planting dates it usually takes about two months for soybeans to progress from full bloom (R2) to full maturity (R8). But according to Cornell's Bill Cox, soybeans planted in June might mature in slightly less than two months. With a May planting date soybeans have a solely thermal response, but at later planting dates crop development is driven both by temperature and a photoperiodic response. So while there are no guarantees, if your soybeans were in full bloom by August 1st there's a reasonable chance that they'll mature for grain before the first killing frost.

If your soybeans didn't reach full bloom by early August then waiting until a killing frost is risky. If frost kills an immature crop the leaves will soon fall from the plants and you'll be left with a very poor yield of low-quality soybean stems and green pods. And at that point I'm not sure what you could do with this crop: It might be too high in dry matter to ensile (not that you should want to!), and yield may be so low so as to make harvest not worth the effort. Confronting a post-frost field of immature soybeans may be like the dog after finally catching that car he was chasing: Now that you have it, what do you do with it?

Soybeans that won't mature for grain harvest can be harvested for silage ***if*** you mow them before frost and before the leaves senesce (turn yellow) and drop from the plant. Most of

See **SOYBEANS,** Page 8

GREEN FARMING: UTILIZING THE GENIUS

Anaerobic digestion has been around for quite a while…It was first determined that methane could be produced by cow manure in 1808 by Humphrey Davy. That's over 200 years! Since then, technological updates and countless studies have allowed for the commercialization of the process. Now engineers are trying to digest anything we can get their hands on including but not limited to; municipal waste, food waste, and agricultural waste. These sources are loaded with carbon and therefore produce large amounts of methane.

The workers of digesters are anaerobic bacteria. They break down carbohydrates, fats and acids down into bacterial biomass, ammonia, carbon dioxide, and most importantly methane. The process occurs in a series of steps; hydrolysis, acidogenisis, acetogenesis, and finally methanogenesis. Fermentative, syntrophic and acetogenic bacteria are responsible for the first three steps and methanogenic bacteria are responsible for producing methane from acetate. These bacteria groups can be kept in the same tank, but digestion is more efficient when they are separated as the acid produced in the first three steps is inhibitory to the methanogens and each of the groups has particular conditions (pH, temperature, etc.) that they are most productive in. Bacteria are constantly reproducing and eating while they are in the digester as long as there is constant inflow of "food", but once the digestate is removed from the digester, the bacteria die because of air contact and aerobic bacteria don't invade the slurry because the "food" has already been consumed, therefore all that is left is a stabilized liquid and solid mixture that can be separated and used for fertilizer and bedding and won't have the odor that usually comes along with manure. There are different types of digesters, but in this farm report I won't dwell on the design itself. The three most popular types are plug flow, complete mix, and cover lagoon digesters. Each of these are different and have their advantages and disadvantages. More information on digesters and the different types can be found at https://www.epa.gov/anaerobic-digestion.

The biogas produced by the microbes can be collected be used for the generation of electricity or of hot water, which allows for a very direct cost benefit. The AA dairy farm from Candor, NY was able to save $24,000 a year by producing electricity by digesting the manure from 550 cows. The heat produced by the bacterial activity and by running the engine can also be utilized to heat water for farms, furthering the savings on energy. For many farms, especially smaller farms (<500 head) the electricity from burning biogas in a combined-heat-and-power (CHP) engine doesn't provide enough financial incentive. Burning biogas in a boiler to produce heat alone to offset heating fuel such as propane or fuel-oil is more cost effective, as a boiler is a lot cheaper and more efficient than a CHP engine. Transforming waste to fuel is great, but there are many other reasons to install a digester on your farm.

The anaerobic digestion process breaks down the digestible materials in the manure, but much like in cow excrement, there is still indigestible fibrous material in the digested slurry exiting the digester. The liquid and solid portions are separated and the solids can be used as a composted fertilizer, or more importantly as bedding for animals! The beauty of this material is that when it is scraped up from bedded pack it is simply put back into the digester and can be utilized again! For this reason, these solids are referred to as recycled manure solids. Organic beddings in general are known to be more conducive to bacterial growth and thus pathogens may be able to grow more rapidly in that media, especially when wet. This is more so the case when dealing with dried manure solids and composted solids because they contain more bacteria and small sticky fibers that cling to the teats. In digested solids, most of the small and sticky fibers that are present in dried manure solids are lost in the process along with the harmful bacteria, which die off in digesters. Therefore, using these digested solids as bedding can be an excellent replacement for saw dust or other organic bedding materials and it can save a lot of money. Some smaller farms have adopted digesters for this purpose alone. It is important to note that research shows that sand is still better for cow comfort, but since it's so hard to work with and causes issues with most manure pits and machinery, it is worthwhile for farmers to look to the future for better and more sustainable bedding materials. Also since the digestion produces so much of this fibrous material it can be applied copiously for cow comfort.

The liquid left over after removing the solids from the digester effluent is used as fertilizer, much like liquid manure is used after being stabilized in a lagoon or pile. There is no nutrient loss. Phosphorus and nitrogen in the system simply react to form simpler compounds such as phosphate and ammonia which are more reactive and available for plant uptake. The amount of carbon is reduced compared to regular manure, but carbon can be added to fields in other ways like practicing no till, planting cover crops, spreading compost or digested solids, and by leaving crop carcasses on the field after harvesting. Pathogen reduction is also significant. Mesophilic (95°F to 105°F) digesters operated at a 20-day retention time can reduce E coli C157:H7 by 95% and have shown large reductions in Johne's bacteria. Thermophilic

Continued on next page

OF RUMINANT SPECIES' STOMACHS

(135°F) digesters show even larger reductions. This is important as concerns of pathogen loading from agricultural fields into drinking water and recreational water sources are becoming substantial.

Odor is a common issue in communities adjacent to farms. The smell is caused by putrefaction, which is the breakdown of proteins, carbohydrates and fats which then causes the release volatile organic compounds (fatty acids) into the air which are responsible for the most odorous scents in manure. Most of the odor usually comes from manure storage, where most of the methane, nitrous oxides and other volatile organic compounds are released into the atmosphere from farms. Not only does it smell, but these volatile compounds pose an environmental threat. Methane is 21 times worse as a greenhouse gas than carbon dioxide and nitrous oxides can be 310 time worse. The release of these gases is usually the target of environmentalists that call farming “bad”. We know that farming is good and necessary, but it is in our best interest to minimize the environmental impact and move towards more sustainable farming. In digesters, the breakdown process occurs in a controlled environment limiting the release of greenhouse gases and eliminating the release of volatile organic compounds. The gas is separated from the liquid and solids mixture for use of fuel or to simply burn off and there is almost no smell to the slurry, making the work and living environment adjacent to agricultural fields and manure pits more pleasant.

With all of these benefits, why doesn’t every farm utilize anaerobic digestion? Well it could be for a variety of reasons. Farm size is a big constraint because of capital cost, and the large residence time of the manure in the digester. To make it worth building, a dairy farm really should be at least 500 head. Although smaller farms have adopted the system using it to displace heating fuel, to reduce odor and to generate bedding material. The capital required to build the digester and maintain it can be substantial. A study by Moser et al. from the EPA found that startup costs can reach $300,000 for plug flow reactors but other digester designs can cost millions. The cost depends on how much construction and alterations that are required to add an anaerobic digester to a farm and the complexity of the digester. For example, a complete mix digester will cost more than a plug flow, but it may be more efficient. There are government grants available to farms to make the investment, however they are competitive and may still not cover enough of the cost to make it financially attractive. Perhaps the largest reason why many farms haven’t made “the move” is out of the lack of knowledge of the benefits, simplicity, and practicality of anaerobic digesters.

Here at Miner Institute, we currently have approximately 500 cows contributing manure to our manure pit. They provide an estimated 29 tons of manure per day. Assuming a plug flow digester with an efficiency like the AA Dairy, we could produce 552 m^3 of biogas at a methane content of approximately 60% per day. Assuming a conservative electricity generator efficiency of 20% (1.2 kWh/m^3 biogas), the system would produce 939 kWh/day, which translates to $13,450 of electrical cost savings per year. By using the dewatered fibrous material as bedding rather than sawdust Miner could be saving over $130,000 per year. If we spend $1,000,000 on installing a digester and assume $25,000 of annual maintenance costs these savings would allow for a payback period of only about 8.5 years without any monetary assistance from grants or tax reductions and only manure is taken in into consideration. It is important to note that any other agricultural waste such as left over or moldy feed and compost could be tossed in as well as any food waste that the farm generates. This will only increase biogas production.

In the northeast, the savings on electrical costs aren’t significant due to hydropower, but in areas where natural gas and oil are the main sources of power the savings can be significant, especially if gas prices go up which is expected. Also, larger farms use less energy per cow than smaller farms, but the amount of manure produced is still the same per cow, so these systems are much more applicable for larger farms. As the human population increases and resources dwindle it is important to look for more efficient practices. Anaerobic digestion offers a way to turn waste into energy, and gives the livestock and dairy industry a possibility to become more sustainable by generating energy, reducing waste, and minimizing greenhouse gas emissions.

— *Casey Corrigan*
corrigan@whminer.com

Learn more about
Miner Institute's Morgan Horses
Visit whminer.org/equine.html

BUNCHING BEHAVIOR – STILL UNRAVELING THE MYSTERY AND SOLUTIONS TO THIS PROBLEMATIC BEHAVIOR

After a recent *Farm Report* article I wrote about heat stress I received an inquiry about why cows exhibit bunching behavior in freestall barns during the summer months. We have wondered the same thing. We know that bunching can increase heat stress experienced by cattle, decrease lying and eating time and increase the risk of injury as cattle fight for center position within the bunch. So mitigating this behavior during the summer months would improve cow comfort, animal productivity and ultimately farm profits.

Even when the weather isn't particularly hot we'll see cows exhibit bunching behavior in pens with relatively good heat abatement. They are usually congregated around the water troughs in the center of the barn. It seems logical for cows to gather at the water during the hottest part of the day, similar to kids heading to the pool. But why is it only one waterer they seem to choose when there are multiple waterers in the barn? Do they congregate where air-flow is best? Not necessarily. As we were developing pen designs that would enable cows to seclude themselves during calving, we were concerned about air flow in a plywood-sided pen particularly during the hot summer months. Well, that small, stuffy pen became a clubhouse for pregnant heifers that seemed to prefer to spend the hottest part of the day bunched together. So, airflow didn't seem to be a factor for them.

Nigel Cook explained in a *Progressive Dairyman* article in 2014 that cows are hardwired as grazing animals to seek shade or dark when it is hot out. So perhaps they are bunching in the darkest part of the barn if our heat abatement is inadequate.

Recent work at UC Davis found that cattle will "bunch" tightly into large groups to avoid stable flies. They observed that bunching protects the cattle at the center of the bunch from stable fly bites because the number of flies per cow decreases with increasing group size of the bunch. They also found that the incidence of bunching behavior varies between California dairies and even between pens within dairies. The reason(s) for this large variation remains unknown and, therefore, recommendations for producers to minimize the behavior on their farms are lacking.

We've been told that the North/South configuration of our barn may be a contributing factor to the bunching behavior because of reduced airflow. Some people have indicated that reversing fan placement in the middle of the barn will improve air flow and reduce bunching behavior. If anyone has tried this please let us know how it works. The Farm Report reader who asked about bunching behavior was hanging a shade cloth to reduce the amount of light that shines into the barn during the early afternoon. I look forward to hearing if that relatively easy fix resolved the bunching behavior in their herd. If anyone has other ideas and remedies for bunching behavior, please share.

― *Katie Ballard*
ballard@whminer.com

FORAGE, Continued from Page 1

There is tremendous variation in uNDF240om that we need to capture when formulating diets and predicting cow response. Clearly, the static relationship of ADL x 2.4 is not accurate given the range in that relationship observed in forage testing lab data. For example, even though the mean relationship between iNDF and NDF is 2.45 for legumes, the observed range is 1.3 to 4.5. For grasses it is 1 to 7.2% - using a standard relationship would lead to erroneous estimates of forage energy value and potential dry matter intake. Clearly, assuming that a constant fraction of NDF (i.e, 2.4 x lignin) is protected by lignification is untrue for legumes, grasses, and corn silages based on accumulated laboratory data.

Understanding and using these basic relationships will be especially important this year, given the terrible cropping weather we've experienced so far in 2017.

― *Rick Grant*
grant@whminer.com

INFECTIOUS BOVINE KERATOCONJUNCTIVITIS (IBK) AWARENESS IN AUGUST

Temperatures are expected to fluctuate this month from the mid 70s to the mid 80s. Humidity is responsible for causing these reasonable ambient temperatures to "feel like" 90°F or higher. For fly populations the temperature and humidity are ideal for living and feeding. Adirondack campers, hikers, and nature enthusiasts are all too aware of the annoying black flies. Not only are they irritating, these flies from the Simuliidae family are responsible for various diseases, with one being Bovine Keratoconjunctivitis (IBK) or more commonly known as pink eye.

IBK is the inflammation of the cornea and the conjunctiva, indicating an eye infection ranging from mild to severe. In some of the severe cases the disease can progress to a loss of vision or permanent blindness. A simple eye infection can result in a loss of appetite, a decrease in milk yield, and even culling. Milk yield can decrease from 90 to 650 lbs per cow annually. Black flies and house flies transfer the bacterium Moraxella bovis from animal to animal. Mechanical irritation causes the disease to develop, so other factors such as dust, tall grasses, UV light, and infected surfaces also play a role in infection. The clinical signs of an infection can include clear discharge from one or both eyes. Infected eye(s) are red and swollen due to inflammation.

Several measures can be taken to prevent the spread of infection to other animals and humans such as administering vaccinations, maintaining low stocking densities, providing shade for pastured animals, and taking action to reduce fly pressures. Flies manifest in organic materials such as feed and some types of bedding. Maggots can be located under the surface of hay and should be destroyed before developing into adults. More flies are found in moist environments, so bedding maintenance and manure control is recommended. Decreasing manure levels will decrease the number of attracted flies to an area. Stress caused by flies can be determined by behavior assessment. Not only will the animals be stomping and flicking their tails, but they also tend to gather closer to one another, in an act termed as "bunching" which may indicate that fly management is inadequate. Humans can protect themselves from infection by washing their hands or wearing gloves.

When animals are infected veterinarians can prescribe an antibiotic ointment such as tetracycline or florfenicol. Other treatments include subconjunctival injections of procaine penicillin. No antibiotics should be administered without diagnosis and prescription from a veterinarian. Infected animals should be separated from uninfected animals and kept in a shaded area with minimal light access. Infected animals should have access to feed and water at all times.

With the month of August comes heat and humidity. The rain may provide temporary relief, but the increase in moisture creates the ideal living conditions for flies. It is important to manage fly populations, and to take appropriate measures when animals are infected by such diseases that are carried by flies.

— Gabbie Green
Summer Experience in Agricultural Research Intern
Reach Gabbie via Katie Ballard at ballard@whminer.com

HOT MAMA!

It's summer and you know what that means: heat stress. As temperatures soar well out of a cow's comfort zone, it's important to remember that it's not only the lactating cows that are getting hit by the high temperatures. While providing heat abatement to the milking cows is top priority, it's also important to make sure that your dry cows are staying cool as well. Heat stress can affect the dry cow's upcoming lactation, but recent research found that heat stress can also impact the calf she's carrying.

The calves from heat-stressed cows face more challenges from the get-go when compared to calves from cooled cows. Before the calves are born they have to adapt to the stressed environment. When a cow undergoes heat stress she shunts energy away from her uterus to combat the stress. This decreases blood flow to the uterus as well as a decrease in placental size and function, limiting the amounts of nutrients and oxygen that reach the calf. Coupled with the fact that the calf is also experiencing heat stress due to the raised internal body temperature of the dam, the calf's developing bodies learn quickly to funnel energy into surviving, but at the expense of growth. As a result, heat-stressed calves are born smaller and more inefficient when it comes to putting energy towards growth. Compared to their cooled counterparts, heat-stressed calves are less efficient at absorbing IgG and other important immune precursors from colostrum. These calves were also shown to have lower lymphocyte proliferation, which suggests a compromised immune system response. Together, these disadvantages put heat-stressed calves at a higher risk for contracting disease during the vulnerable first few weeks of life. While these calves can grow at a similar rate as calves from unstressed dams, they never recover that initial growth loss.

There's evidence that calves born from heat-stressed cows can also suffer as lactating cows in their future. Though average age at first calving remained the same, most of the heifers that experienced heat stress in-utero required more services to conceive. These heifers also have less prolific lactations, with a daily average milk yield 11 lbs. lower than that of the cooled heifers in the first 35 weeks of lactation. This adds up to a total loss of about 2,700 lbs. for the first lactation which is a significant forfeiture, especially if it can be prevented early on.

The mechanism for this loss of efficiency in heat-stressed calves can in part be described by epigenetics. Because of the stress the calves underwent, their gene expression may be more geared towards storing energy instead of putting it towards lactation and efficient growth. While these calves may be better at functioning under heat stress in their future, it's at the expense of functioning economically in comfortable conditions, which can be provided. Bottom line: For the better future herd cool off those hot mamas!

— Courtney Hoff
Summer Experience in Agricultural Research Intern
Reach Courtney via Katie Ballard at ballard@whminer.com

SOYBEANS, Continued from Page 3

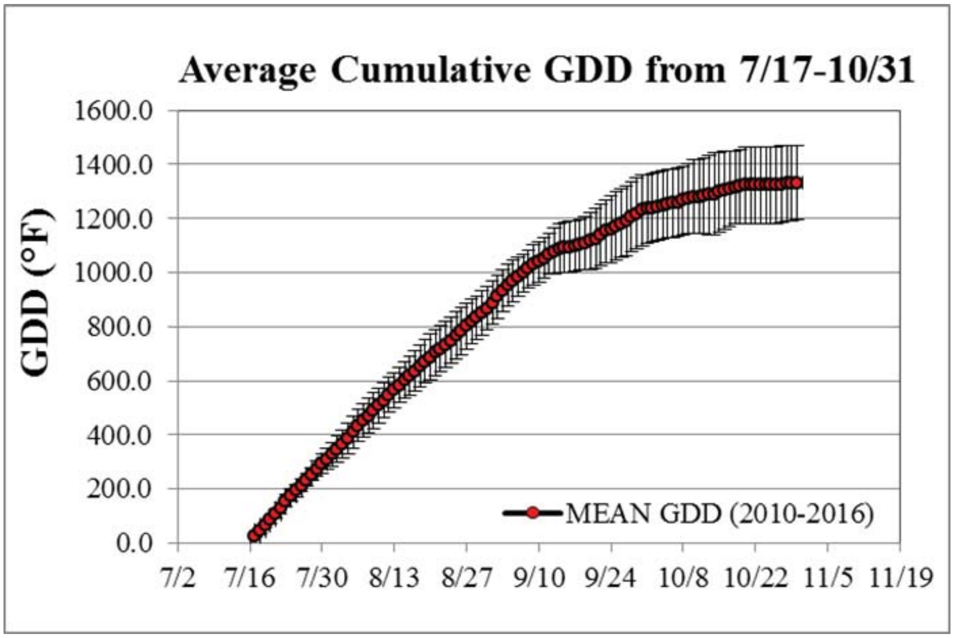
the nutrition in soybean silage is in the leaves. I'm not a big fan of the stuff, which tests much like full-bloom alfalfa (18% protein, 45% NDF) but probably isn't as palatable. However, with the forage quality and quantity challenges many dairy farmers are facing this year this crop could be put to good use. If possible harvest at the full pod stage when the leaves are still green since as noted they contain much of the feed value. However, there's a wide range of acceptable harvest stages--the key is to get the crop harvested before frost. Obviously yield will vary, but a decent field of soybeans harvested at the full pod stage will yield about 2 tons of dry matter per acre or 5-6 tons of 35% DM silage. Some fields I've been looking at will almost certainly yield less than this. On-the-stem dry matter will probably be less than 30% so you'll need to windrow the crop and let it dry to about 35% DM. With a September harvest this could take at least two days, so use wide windrows. *Note: There are several popular soybean herbicides that have label restrictions preventing their use for forage or silage. READ THE LABEL before making any decision on harvesting soybeans for silage.*

— E.T.

WILL YOUR CORN SILAGE CROP MAKE IT?

Planting date	5/1	5/15	6/1	6/7	6/15
Accumulated GDDs as of 7/16	908	821	729	666	495
Needed GDDs	1092	1179	1271	1334	1505
Est. harvest date	9/15	9/27	10/10	10/31	?

The 2017 cropping season has been a difficult one in the Northeast. Snowstorms in mid-March followed by above–average rainfall for April, May, and June created wet conditions and made timely planting and harvesting hay crops a serious challenge. In Chazy, April, May, and June rainfall were 1.58, 1.35 and 1.36-fold greater than 30-year averages. While a few farms were able to get some portion of their corn planted in early to mid-May, much of the 2017 corn crop was planted in late May and well into June. If most of your corn crop was planted after the first week of June, switching to shorter-season hybrids (<90 day relative maturity) may increase your chances of harvesting higher quality corn silage.



Weather profoundly affects corn growth and development. While soil fertility and physical conditions are important, temperature and moisture influence both physiological development and what's happening in the soil. While corn can handle temporary soil saturation, repeated saturation depletes oxygen, which is essential for proper plant respiration. Excess soil water also leaches nitrate-nitrogen from soil, slows mineralization of organic N to plant-available N (since soil bacteria need oxygen) and causes denitrification (loss of nitrate-N to the atmosphere). The combination of these factors largely explain the "up and down" patterns of corn growth going from better-drained portions of a field to lower, more imperfectly drained areas. Raindrops themselves cause further physical soil limitations, including compaction and surface crusting. Compaction and surface crusting limit oxygen diffusion into the soil and make it more difficult for seedlings to emerge and grow.

Does your corn crop have a good chance of making it? It depends on when it was planted, relative maturity, and the weather. The number of heat units, expressed as growing degree days (GDD), is the best indicator for tracking development. For corn, GDD is calculated by subtracting 50 from the mean daily temperature (high temp. + low temp./2). Research by Bill Cox at Cornell has shown that ~2,000 GDDs are needed for 96-100 day hybrids to go from planting to harvest moisture for silage.

Assume you planted a 96-100 day hybrid on May 15. Based on cumulative GDDs from 5/1 to 7/16 in Chazy and using 7-yr average GDDs from 7/17 to 10/ 31 (see figure), the predicted harvest date would be 9/15. Corn planted on 5/15 would have a predicted harvest date of 9/27. For later planted corn, it gets riskier. Corn planted on 6/7 would have a 10/31 projected harvest date. The average date of first frost is between 10/1 and 10/10 in our region, which complicates matters more. Corn planted 6/15 would need above-average GDDs in October to have a chance. If you dropped relative maturity and planted after 6/15, your chances are better. This year it will be imperative that you closely monitor corn development and assess whole plant moisture prior to chopping.

— Eric Young
young@whminer.com

WHEN IT COMES TO HOUSING CALVES, TWO MAY JUST BE BETTER THAN ONE

If you're like many dairies in America, your calves are probably housed individually until the time of weaning. This widely-adopted method of raising calves has several perceived advantages with the major being reduced disease spread. However, recent research suggests that pair housing calves can be beneficial. In a study conducted by the University of British Columbia in 2010, paired and individually housed calves were monitored for intake throughout the pre-and post-weaning periods. Vocalizations were also measured during the weaning process to evaluate stress in the calves. The study found that intakes were similar between the two groups over the length of the study. However, the researchers found that when the calves were grouped into pens after weaning, the paired calves visited the feeder sooner, more often, and ate more during the first few days after mixing into the weaned group. Individually housed calves vocalized three times more during weaning than their paired counterparts, suggesting that having a social partner may help reduce the detrimental effects of stress at weaning. They also suggested that paired calves might have a greater ability to adapt to different environments than the individually housed calves.

A 2013 study in the United Kingdom compared vocalizations in individually housed calves vs. calves paired at either day 5 or day 28 after birth. The study found that individually housed calves vocalized the most and calves paired at day 28 vocalized more than calves paired at day 5, suggesting that the sooner calves are paired, the greater the benefit. Currently, the research is somewhat conflicted on whether paired or group housing increases intake and growth over individually raised calves. Several studies suggest it might, while others have found no difference between treatments. These studies use different management practices and experimental designs, which should be accounted for when comparing the research.

In addition to decreasing stress as well as potentially improving performance, some research suggests that pair housing calves might even help their cognitive development. In a study conducted by the University of British Columbia in 2013, researchers looked at how well paired and individually housed calves performed in two different cognitive tests. One test involved a calf having to discern between two colors and being rewarded for one, followed by reversing the colors and tracking the calves' performance. The other test involved examining how calves responded to new objects. They found that the paired calves performed better in both, suggesting for the first time that individually housing calves may negatively impact their cognitive development.

If you're anything like me you probably have some apprehension about pairing or socially housing calves, namely, disease transmission. However, much like performance, disease incidence of calves raised in pairs or groups is not conclusive. Some studies have shown decreased health in group housed calves, others have shown no impact. No direct link between group housing and disease has been shown. This is due to the fact that several factors go into the spread of disease. So, if these factors, such as hygiene, health checks, and ventilation are focused on, then disease risk should be decreased, regardless of housing style. Other unwanted behaviors such as cross suckling can be reduced through management practices such as more gradual weaning as well as the use of a bottle provided over longer periods throughout the day.

Overall, pair housing calves offers several benefits. These include the possibility of greater performance out of our calves as well as reduced stress during changes in the environment. Additionally, pair housing calves might also help their cognitive development as well. At the same time, some of the common drawbacks could also be reduced through proper management practices. If implemented properly, pair housing might be a great way to optimize the performance and development of our calves.

— Benjamin Henrichs
Summer Experience in Agricultural Research Intern
Reach Benjamin via Katie Ballard at ballard@whminer.com

SAVE THE DATE: February 27, 2018

2018 Vermont Dairy Producers Conference
Sheraton-Burlington Conference Center in Burlington, VT
8 am to 4 pm

Find more information:
https://vermontdairyproducers.com/
https://www.facebook.com/VermontDairy

SAVE THE DATE: OCTOBER 28, 2017

Day of the Morgan

Miner Institute is pleased to open up our historic horse barn and participate in the American Morgan Horse Association's national event celebrating the Morgan horse!! The event is an effort to introduce the public to the breed. We are happy to participate in this great event and show off some Miner Morgans!! Specific event details are still in the works.

For more information, contact Karen Lassell, lassell@whminer.com
or call 518-846-7121, ext. 120 or visit the Heart's Delight Morgan Horses facebook page!
https://www.facebook.com/HeartsDelightMorganHorses/

The William H. Miner Agricultural Research Institute
1034 Miner Farm Road
P.O. Box 90
Chazy, NY 12921

Change Service Requested

Non-Profit Organization
U.S. POSTAGE PAID
Chazy N.Y. 12921
Permit No. 8

Closing Comment

Intelligence is like underwear; it's important that you have it
but not necessary that you show it off.

www.whminer.org
518.846.7121 Office
518.846.8445 Fax