FARM REPORT

In This Issue:

https://www.instagram.com/minerinstitute/

Find us on Facebook

facebook.com/MinerInstitute

FROM THE PRESIDENT'S DESK: UNDERSTANDING FACTORS THAT AFFECT COLOSTRUM YIELD & COMPOSITION

Every year, dairy farmers face the challenge of fluctuating colostrum yield and composition in their cows, prompting questions about why these variations occur. Understanding these dynamics is crucial as colostrum plays a vital role in calf health and future productivity.

Ensuring calves receive adequate colostrum is essential since colostrum 1) transfers immunity passively to newborn calves since maternal antibodies can't cross the placenta, 2) aids in the development of the gastrointestinal tract (GIT) of calves, and affects future performance by improving first-lactation milk production. Ideally, a calf should receive 8.5 to 10% of its body weight in colostrum within the first hours of birth. For a 100-lb Holstein calf, this translates to 8.5 to 10 lb or approximately 1 gallon or 4 L of colostrum. The colostrum should be of good quality containing >50 g of IgG/L. A colostrometer reading in the green region or a Brix refractometer reading of >22% is desired.

A recent review in the Journal of Dairy Science by Westhoff, Borchardt, and Mann explored critical factors impacting colostrum yield and quality in dairy cows. Here are some highlights:

Colostrum Variation

- Colostrum yield and composition vary throughout the year. Typically, the lowest yields are seen in late fall and early winter, while the highest occur in late spring and early summer. The IgG content tends to be lower during summer. Although the IgG concentration is commonly thought to be influenced by a dilution effect, yet yield or dry matter content of the colostrum has a marginal effect on the IgG concentration.
- Colostrum yield varies between cows in the same herd and is associated with parity, month of calving, and genetics. Interestingly, colostrum quality and composition have a low to moderate heritability. It is likely that endocrine signals in the dam related to calf sex, size, and viability affect colostrum yield.
- Herd-level differences in colostrum yield and composition within a geographic region indicate that factors other than month of calving and cow factors influence colostrum synthesis. However, our ability to routinely use on-farm nutritional and management strategies to improve colostrum yield and composition have been limited indicating a need to better understand mechanisms of colostrogenesis.

Prepartum Nutritional Strategies

- *Dietary energy:* Increasing the starch:NDF ratio doesn't impact colostrum yield but decreases IgG concentration.
- *Dietary protein:* Metabolizable protein (MP) supply doesn't affect colostrum yield in most studies when MP supply ranged from ~700

See **COLOSTRUM**, Page 6

IS SHE READY TO WEAN?

Weaning is something I've been turning over in my mind recently. It's inevitable, and every farm's strategy is different based on resources, time, and spatial needs. As luck would have it, I opened the June issue of Hoard's Dairyman to find that another reader has been thinking the same. Dr. Terri Ollivett, DVM, penned a response to their question if there was an ideal weaning strategy to follow since they had increased the volume of milk they were feeding their calves. Dr. Ollivett's response was that there is no consensus on an 'ideal' weaning strategy as long as health, welfare, and performance outcomes are taken into consideration. About 30% of farms in the US and Canada wean calves by 8 weeks (wk), and a USDA NAHMS report from 2014 indicated that 31% of farmers in the US were weaning calves after 10 wk. Less than 10% of US farms were weaning calves at ≤6 wk. Some of the common benchmarks for weaning have always been increased starter intake, growth, play behavior, and reduced vocalizing or other non-nutritive behaviors that indicate hunger. A combination of these is often used by farmers to determine if a calf is ready to wean. However, there is very little data evaluating weaning methods. A recent Journal of Dairy Science invited review by researchers at Aarhaus University in Denmark provided a systematic review of weaning practices, with a focus on weaning age, weaning duration, weaning criteria, and weaning methods. Of the 44 studies included in the meta-analysis, the majority focused on weaning age (n = 22), followed by weaning duration (n = 13) weaning criteria (n = 9), and other methods such as dilution, linear vs. step-down milk reduction, and meal-based approaches (n = 6). Let's take a look at the top three weaning factors (age, duration, criteria) and review the evidence to date.

Weaning age. In this review, "earlier" weaning ages were between 28-63 days (d), and 'later' weaning was between d 49-119. Of the studies reviewed, the majority reported that calves weaned at a later age (≥7 wk) consumed less starter but were not delayed in terms of growth. Calves weaned earlier have a greater need to find alternative food sources to milk/milk replacer, and therefore often consume more starter, though may be more stressed than calves weaned later. Since later weaning allows for increased milk allowances during preweaning, studies showed that older calves consumed larger amounts of feed during weaning and 2 weeks post-weaning, indicating adequate ruminal and gastrointestinal preparation for the transition to solid feed. The studies also indicated later weaning had positive effects on average daily gain (ADG) and body weight. Not enough evidence exists to determine the effect of age on behavioral indications of hunger, though calves weaned ≥8 wk vocalized less than calves weaned at ≤6 weeks. Overall, if spatial needs and resources allow and preweaning milk allowances exceed 6 L/d, weaning ≥8 wk appears to show no disadvantages to growth or feed intake and is recommended for superior ADG.

Weaning duration. Weaning durations between 1-11 d were classified as "shorter", while durations of 12-35 d were considered "longer". Longer weaning durations were favored for greater starter intake, based on milk allowances between 6-12 L/d. Short or abrupt weaning periods were shown to be more stressful and result in more health problems. Later weaning and longer weaning durations with gradual milk allowance reduction resulted in positive effects on ADG, rumen development, and growth compared to shorter weaning periods with more drastic milk allowance reduction. Calves are more likely to transition more easily to solid feed if intake of starter is established as weaning begins, and weaning over longer periods of time allows for more familiarity and uptake of solid feed. If the rumen is underdeveloped, metabolizable energy obtained from solid feed may be compromised by not supporting comparable ADG relative to growth rates while still consuming milk.

Weaning criteria. The long-accepted industry standards for weaning criteria have been for calves to double their birth weight by 56 d, and the Bovine Alliance on Management and Nutrition recommended that calves consume at least 0.9 kg/d (~2 lb) of starter for 3 consecutive days prior to weaning. Surprisingly, this review uncovered no studies that examined weight-based criteria for weaning, though the majority of farmers surveyed in the 2014 USDA NAHMS study and elsewhere used this method. While this benchmark is widely and conveniently accepted, the credibility and appropriateness of this criteria as a best practice remains in question. Starter intake-based weaning criteria had the most positive influence on ADG and growth. The updated NASEM 2021 requirements now suggest that small breed calves should be consuming at least 1.25 kg/d (2.75 lb) and large breed calves consuming 1.5 kg/d (3.85 lb) of starter prior to weaning.

In summary, while there is no universally ideal weaning strategy, evidence points to a few concrete suggestions to follow when determining if your calves are ready to wean. First, there is no disadvantage to weaning later (≥8 wk) if spatial allocations permit, and avoid weaning earlier to ensure that calves receive adequate milk allowances. Second, a longer, gradual step-down method is better than a shorter, more abrupt weaning duration to encourage solid feed intake. Third, while the double birth weight benchmark is widely used in practice and can still be used as a tool, starter intake-based weaning is a more validated method.

— Cari Reynolds
reynolds@whminer.com

EVALUATING ALFALFA-GRASS STANDS — AND SOME COMMENTS ON GRASS

By now most farmers will have harvested at least two cuttings of their alfalfa and alfalfa-grass fields, so this is a good time to decide which fields should be rotated to another crop in 2025. Often this crop will be corn since it makes good use of the nitrogen from the decaying sod. The decision on each field will be influenced by the condition of other hay fields since farmers usually rotate their worst-yielding fields. If the field has a decent stand of grass the productive life of an alfalfa-grass (or grass-alfalfa) field can be extended by topdressing with liquid or slurry manure. This decision may be influenced by the grass species since tall or meadow fescue will respond much better to manure topdressing than will (ugh) timothy. Manure won't burn the foliage as long as it's applied within a few days of harvest. Delaying application by a week or more could damage the alfalfa regrowth (by wheel traffic at least, and perhaps by the salts in the manure). Also, while alfalfa regrows from crown buds, grass regrows from the cut stems. Therefore, depending on the amount and severity of rainfall between cuttings, painting grass with a coat of manure could result in manure residues in the next crop.

If there aren't recent soil analyses on fields that will be rotated to corn, this fall would be a good time to take them, preferably after the season's last manure application. Alfalfa is a heavy user of potassium and so is corn chopped for silage, so it's important to maintain good soil K levels throughout the rotation. Manure will help do this, but an application of potassium fertilizer (such as 0-0-60) may also be needed.

I have no idea why seed sales of timothy remain as high as they are; right after first cut timothy takes a snooze for the summer, so topdressing manure after first cut might help the alfalfa but will usually do little for the timothy. *In my opinion, timothy has no place on a modern dairy farm.* One reason some farmers grow timothy is to sell to horse owners, a notably picky lot. Some of the best hay produced in the Northeast, often pure alfalfa without a trace of weeds or mold, is sold to the owners of racehorses. The owners of pleasure horses often aren't nearly as knowledgeable but most can identify timothy hay because of its characteristic head. This might partly explain the continued popularity of this species.

Finally, some comments about orchardgrass: This past spring a Vermont dairy farmer (and former Miner Institute student) phoned, still chuckling after looking at one of his alfalfa fields. Some orchardgrass seed had obviously blown into the field (probably from some non-cropland) since there were a bunch of orchardgrass plants at the edge of the field, *already fully headed in mid-May.* The alfalfa was still a couple weeks from harvest. He recalled my long-ago comment at a farmer meeting: "I hate orchardgrass!" That was about 20 years ago, but at the time I'd already been disparaging orchardgrass for at least 20 years. Proponents of this species will note that newer varieties are much later-maturing than what blew into my friend's field, but even the so-called "late" orchardgrass varieties are too late for my liking. One year I decided to try one of the latest-maturing orchardgrass varieties at Miner Institute, planting it at a seeding rate of 1 lb. of orchardgrass and 14 lbs. of alfalfa. It seemed that every orchardgrass seed grew, and we had to manage that stand very carefully to maintain forage quality since I have an absolute abhorrence of headed orchardgrass. This species has poor tolerance to ice sheeting--even worse than alfalfa--though I wasn't exactly heartbroken to see it die in the places we had some ice. My decision after we rotated that field back to corn: Never again.

— Ev Thomas
ethomas@oakpointny.com

UPCOMING RESEARCH PROJECT AT MINER INSTITUTE

In the next few weeks, Miner Institute graduate student Bridget Craig will be sending out recruitment emails to participate in her research project, investigating dairy farmer willingness to adopt alternative management practices. Keep a look out for an email from her!

HOW CAN WE CHANGE COLOSTRUM QUALITY AND QUANTITY ON FARM?

Colostrum quality and quantity can often be fleeting at times on farms, and shall we say rather frustrating? We know that this is a very important component of the calf program to get right, with a limited window for getting it to the calf. We want to do everything we can to get that critical meal (or two) to the calf. Utilizing the opportunity to capture the colostrum already produced from the cows within the herd will likely set your calves up for the greatest success if handled appropriately. But what else can we manage in terms of optimizing colostrum yield, IgG, and component concentrations to get the most out of our cows and the best for our calves? A recent invited review in the Journal of Dairy Science (107:4109-4128) summarized our current knowledge of the variables impacting colostrum on farms.

The three areas include 1. cow factors, 2. colostrum harvest, and 3. post-harvest management.

Cow factors the authors identified are nutrition, environment, management, genetics, health, endocrine and metabolic signals. There is a lot of seasonal, individual, and herd-level variability that plays into the supply of colostrum. Yield and IgG concentration has been documented to change throughout the year. It's still unclear if this is related to light or temperature and humidity as these are not easily teased apart from each other. There is a large individual variation, and the authors of the review indicated based on two studies that between 60-65% of Holstein cows failed to produce 6 or more liters of first milking colostrum, which would be needed to feed 3-4 L for a first feeding and 2 L for a second feeding. Furthermore, 7-32% of cows failed to produce high-quality colostrum (>22% Brix). Things like parity, breed, characteristics of previous lactation, or heritability have been evaluated often with mixed results. At the herd level some indications of farm management, prepartum nutrition, or environmental conditions may influence colostrogenesis. Currently, I don't think there is clarity on how these factors play into our ability to manage, and manipulate, colostrum production, but hopefully we can understand this more in the future. Cow factors that have been associated with improved colostrum includes an adequate dry period >45 days and cooling during heat stress.

Colostrum harvest includes the harvest procedures, time to harvest colostrum, and use of oxytocin. Harvesting colostrum within 8 hours of calving is important to optimize both yield and quality of colostrum. There is limited information about the effect of administering oxytocin. One study noted that colostrum yield was not affected when a calf was present during colostrum harvest or when oxytocin was administered, but IgG was increased slightly. More studies on this are needed to make this recommendation.

Post-harvest management includes contamination, heat treatment, and storage. Heat treatment of colostrum has been a useful and effective strategy to minimize the bacterial counts of colostrum. However, it does not eliminate the risk. If handled poorly after heat treatment, bacteria that remain can proliferate again. Furthermore, there is some recent work that looks at the other components found in colostrum like insulin and IGF-1 which are involved in gastrointestinal tract development. More information is needed in this area before we fully understand the impact of heat treatment on bioactive components of colostrum, so if heat treatment works for you and your calves, keep doing it! There are studies that have shown improvements in IgG absorption when calves are fed heat treated colostrum. Storage can play into the success of any colostrum program. We want to minimize the time it takes to cool (below 60°F) for the refrigerator or find ways to cool before adding big supplies to a freezer to prevent freeze thaw cycles. On the other hand, as we feed it out, we also want to minimize the time it takes to warm it up above calf body temperature, without denaturing the proteins with too hot of a water bath (<140°F).

Colostrum synthesis and production is a very short, but important, process that plays a big role in the calf's success within the herd. Unfortunately, there are many factors that play a role (or could) in terms of how much each cow produces and the quality of it. We are always learning more about this process but as a true scientist, I have to say, we still need more information to be able to manipulate and understand this process.

— Sarah Morrison
morrison@whminer.com

MOTIVATIONS TO CHANGE: WHEN DOES STUBBORNNESS END & NECESSITY BEGIN?

To close out national dairy month I traveled with coworkers from Miner Institute to sunny West Palm Beach, Florida, for the 2024 America Dairy Science Association annual meeting. As I hone my own qualitative research skills – collecting interpretive, subjective data - I set a goal of absorbing as much of this type of research as possible. I attended talks about how to improve dairy employee training and safety, an exploration of consumers' willingness to pay for artisan cheese, and a discussion of how veterinarians serve as cornerstones of scientific communications within their communities. I've found a niche I'm quite attached to – I'm interested in the side of dairy science that is centered around human interaction.

On Tuesday I saw Temple Grandin of Colorado State University animal welfare fame speak about the Five Domains of Animal Welfare. She spoke at length about considerations for improving animal welfare in both dairy and beef systems, but the tidbit I found most interesting was her discussion of how to get slaughterhouses to change their management strategies and infrastructure with welfare in mind. Answering a question from the crowd, Grandin explained how she believes that government regulations result in little impactful change and leave farmers and processors with a redoubled dissatisfaction with those who are supposed to protect and represent them. Instead, she described the success she'd seen with corporate requirements, meaning the buyer at the top of the supply chain would not purchase from a processor that was using sub-standard welfare practices. When faced with the possibility that their product would not be picked up, plant managers were quick to change.

Since Grandin's example came from the beef world, I became curious about how this mindset could impact the dairy industry. I found myself Googling phrases like "how to motivate people to change their behavior" and "motivations to change" in preparation for this article. There are countless self-help and personal growth publications available which offer varying degrees of success, but it's another challenge all together to change someone else's behavior the way that you – the manager, buyer, consumer, regulator – want them to.

I'm not so pessimistic as to believe that the threat of losing money is the only motivation to change for the better in animal agriculture. While farming is a business, farmers at large have a connection with their animals and an intrinsic desire to give them a good life. Dairy farms require inspection to maintain their milk license, and most cooperatives require dairy farms to undergo periodic welfare audits such as the FARM audit. Farms can be removed from their cooperative if they fail to comply. While some current welfare topics might be controversial among farmers and scientists, the understanding that a calm, relaxed cow is more productive is well-accepted. Topics like cow-calf separation and paired calf housing may be important to consumers but are a tough pill to swallow for some farmers. In the dairy food system, where the supply chain flow is unique in its widespread use of the cooperative model, how could this motivation to change manifest?

While dairy science and farming are deeply animal based, the success of the industry lies with consumers. With public perception of dairy farming under pressure, both in environmental and welfare terms, the industry must work diligently to maintain good standing with dairy consumers. In the end, the consumer is the supply chain top dog, deciding to purchase products with an impossible to measure combination of superstitions, beliefs, tastes.

— Bridget Craig
bcraig@whminer.com

Is there something you'd like to know more about?

Email article suggestions to dutil@whminer.com

TICK, TICK, TICK…

That's the sound NY farmers may be hearing concerning their long-term use of neonicotinoid insecticides. This past December NY Governor Kathy Hochul signed the "Birds and Bees Protection Act", the first in the nation to prohibit the use of neonicotinoid-treated seeds for corn, soybean, and wheat production due to the risk they pose to pollinators. The seed treatment ban doesn't come into effect immediately, and still will allow the use of "neonics" on field crop seeds if not treating them causes "undue hardship". This law was signed in 2023 but won't come into effect until 2029. Under the revisions that the governor put forward before signing the law, the bill may not be as restrictive as the one the legislature passed. The law would make it illegal to use neonic-treated seeds for corn, soybean, or wheat without a waiver. To continue using neonic-treated seeds after the 2029 planting season, farmers will need to present an evaluation showing that their fields are under threat from pests. What type of evaluation will this be? To whom will they present this evaluation? Hmmm…. Farmers using neonics would also be required to take integrated pest management training, which seems like a reasonable idea though you'd think that any farmer who's a Certified Pesticide Applicator would have already had this training.

At this point it's hard to be optimistic about the long-term use of neonicotinoids for seed treatment, at least in NY but in other states as well. In part the NY legislation is due to a 2020 assessment by Cornell University which found that about 90% of field trials showed no effect on corn or soybean yield from the use of neonic seed treatments. If you're interested in more information: https://cornell.app.box.com/v/2020-neonicotinoid-report The report is 432 pages long (!), so most would be more likely just read the Executive Summary beginning on page 19. The devil is in the details, though, and you might also want to read the chapter beginning on page 127 regarding the studies on neonic use on field corn.

It's been many years since most NY farmers have planted untreated seed corn or seed treated with just a fungicide. I'm old enough to remember the days before neonics, when farmers used do-it-yourself planterbox treatments combining fungicide and insecticide that came in little packets or bottles. The directions were to thoroughly premix the treatment with the seed, but all too often farmers would simply dump the contents on top of the just-filled seed hopper and rely on gravity to do the mixing. Some farmers attempted at least a cursory mixing — a tell-tale sign was the characteristic "pink arm" since that's what they used to mix the treatment. I also remember doing some postmortems of spotty, thin stands of corn where the farmer didn't use a planterbox treatment. By the time I arrived it was impossible to tell how much of the problem was from the lack of a fungicide and how much was due to soil insect damage, mainly wireworms or seed corn maggot.

Over the past 20 years of so, how much has changed in the pest pressure affecting corn and soybean seed? I don't know, but expect that in the coming years we'll be finding out.

— Ev Thomas
ethomas@oakpointny.com

COLOSTRUM, Continued from Page 1

to 1400 g/d challenging the current dogma of providing more MP when colostrum yield is low. However, a study with a higher amount of MP (~1600 vs. ~1200 g/d) showed a colostrum yield and IgG concentration benefits for cows entering their second parity. Younger cows appear to benefit from additional MP.

- *Dietary minerals and vitamins:* Use of DCAD and zeolite products in the close-up period to reduce the risk of excessive or prolonged hypocalcemina after calving in general do not affect colostrum yield or IgG concentration when intake is maintained. Vitamin D in the form of calcidiol (i.e., 25-hydroxyvitamin D3) tends to increase colostrum yield compared to cholecalciferiol.

Prepartum Management Strategies

- *Dry period length and time in close-up pen:* Colostrum yield is greater for a traditional dry period length than a shorter dry period (i.e., 30 to 40 d). Colostrum IgG concentration is not affected unless the dry period is omitted. Time in the close-up pen and stocking density are not associated with colostrum yield or Brix % under standard management practices.
- *Mitigate heat stress:* Cooled dry cows produce more colostrum with a higher IgG concentration than heat stressed dry cows. It pays to cool dry cows.
- *Vaccination timing:* Avoid vaccinating cows and moving them to a new pen on the same day. There seems to be a negative interaction of vaccinations and other stressors to the immune system. Giving vaccines earlier in the dry period before a pen move or given repeatedly and consistent with manufacturer recommendations might be beneficial.
- *Time to colostrum harvest:* Colostrum should be collected <8 hours after calving to maximize bioactive components and IgG concentration. IgG concentration or Brix % decreases when colostrum is harvested ≥ 6 to 9 hours after calving and yield increases when harvested ≥ 12 hours after calving.

It's clear that managing colostrum effectively requires a holistic approach that considers both nutritional and management strategies before cows calve. There are several groups in North American and Europe that are actively researching the mechanism of colostrum production with the goal of bring some innovative strategies to the farm.

— Heather Dann
dann@whminer.com

BODY WEIGHT LOSS AFTER CALVING & ITS ASSOCIATION WITH MILK PRODUCTION

The transition period is a time where cows experience negative energy balance (NEB) and mobilize body fat to meet the energy demands of milk production. As a result, this is a time when they are likely to lose weight. Even knowing this, when I was working with some body weight data we've collected at Miner Institute from cows during the transition period, I was amazed by how much weight some cows actually lost after calving and in the following weeks. Immediately after calving cows can lose 80-100 lbs, of course due to the loss of the calf weight but also the large amount of amniotic fluid and the fetal membranes. When comparing cows' body weights from immediately after calving to weights taken during their third week of lactation, some cows maintained weight, some gained, and some lost upwards of 200 lbs.

For most of our research studies at the Institute we take body weights and body condition scores once a week. A paper published in the *Journal of Dairy Science Communications* titled "Association between change in body weight during early lactation and milk production in automatic milking systems" captured body weights at every milking. This allowed the researchers to calculate daily averages so that weights were adjusted for rumen fill. The researchers were interested to see if the changes in daily body weight during the first 3 weeks of lactation had any relationship with cows' productivity down the line. This observational study collected data from 4,695 Holstein cows on 34 automated milking system farms for a 12-month period. For each cow a 21 days in milk (DIM) body weight change and a 90 d cumulative milk yield were calculated. All data was analyzed by lactation, with the lactation groups being cows in their first (L1), second (L2), or third and greater lactation (L3+).

The researchers found a negative quadratic association between the 21 DIM body weight change and 90 d cumulative milk yield for all lactation groups ($P < 0.0001$). This means that cows with less extreme body weight changes at 21 DIM had a positive relationship with milk yield, while cows with more extreme body weight changes (i.e., ≥10% change) at 21 DIM had a negative relationship with milk yield. The researchers found that the cows that were most productive, i.e. greatest 90 d cumulative milk yields, lost on average 7.42%, 5.02%, and 4.52% of their initial body weight, for L1, L2, and L3+, respectively. These percentages of body weight changes equate to 75-100 lb of body weight lost during the first 21 DIM, which is a loss of more than 2 lb./d. In this study, cows were most productive during the first 90 DIM when they either maintained or lost about 10% of their initial body weight after calving. Therefore, losing or gaining more than 10% of initial body weight post calving is likely to have a negative impact on milk yield. For example, in this study, a L3+ cow that lost 4.5% of their BW by 21 DIM had a 90 day cumulative milk yield of 10,027 ± 115 lb (~111 lb/d). A L3+ cow that lost 21.4% of their body weight had a 90 d cumulative milk yield of 7,943 ± 357 lb (~88 lb/d), and a L3+ cow that gained 16.7% had a 90 d cumulative milk yield of 6,695 ± 330 lb (~74 lb/d).

A study published in the *International Journal of Animal Biosciences* looked at the relationships between BCS and weight change on milk production and had similar results to the study mentioned above. These researchers found that cows that lost 220 lb of body weight from calving to their lowest weight, produced on average 306 lb more milk during the first 60 DIM compared to cows that only lost 110 lb of body weight. Cows that had greater body weight loss after calving were also associated with having higher and earlier peak milk, and increased lactation persistence.

Often we think that it's bad when cows are losing a lot of weight after calving and that they're at greater risk for common early lactation issues such as ketosis. And while losing large amounts of weight in the weeks after calving does put cows at greater risk for ketosis, if cows aren't mobilizing some body fat and losing weight after calving then they won't reach their full production potential. During the transition period, all cows are likely to be in NEB and lose weight. This may cause cows to experience some trouble, but even then not all cows will experience problems in the same way. Dairy cows today can lose weight, be in NEB, and continue to be productive. If able, managing and monitoring body weight change after calving is a great tool for managing transition cows. Doing so can help identify cows that might be gaining or those losing weight too quickly and are at greater risk for transition cow issues. Cows are meant to lose weight and mobilize body reserves after calving, it plays an important role for high production.

— Emily Bourdeau
ebourdeau@whminer.com

YOUNGSTOCK BEHAVIOR & WELFARE HIGHLIGHTS FROM ADSA

As a first-time attendee at this year's American Dairy Science Association (ADSA) annual meeting in June, I was amazed by the volume of research presented. There were over 1,700 research abstracts about every dairy-related topic you could think of presented by researchers from around the world. Youngstock behavior and welfare always piques my interest and as you can imagine there was an array of abstracts about this topic. Below is a non-exhaustive list of subjects that were discussed:

Disbudding Methodology

Drwencke et al., from the University of California-Davis compared different methods of disbudding with their abstract titled: "Wound characteristics following hot-iron and 4 approaches to caustic paste disbudding in dairy calves". Researchers assigned roughly 150 calves to one of six treatments: non-disbudded control, hot-iron, 0.2 mL of paste on shaved or unshaved horn buds, or 0.3 mL of paste on shaved or unshaved horn buds. Wounds were monitored until fully healed by scoring the stage of healing, measuring the size of the wounds, and measuring wound sensitivity.

All methods of removal were similarly effective at removing the horns except for the group that received 0.2 mL of paste on unshaved buds; these calves showed horn regrowth at over double the rate of other treatments. Wound size was similar amongst all disbudded treatments but among the paste treatments, wounds were larger on shaved buds compared to unshaved buds and with 0.3 mL of paste compared to 0.2 mL. All treatment groups were more sensitive to pressure compared to non-disbudded calves for at least 4 weeks and paste took longer to heal from than the hot iron (described in the table above).

TREATMENT	HEALING TIME
Hot iron	7 weeks
0.2 mL paste, unshaven	14 weeks
0.2 mL paste, shaven	16 weeks
0.3 mL paste, unshaven	16 weeks
0.3 mL paste, shaven	19 weeks

Milk Feeding Methodology

Alcantara et al., from the Universidade Estadual Paulista Botucatu in São Paulo, Brazil presented a poster titled: "Meta-analysis of the effect of milk feeding method on average daily gain, concentrate intake, and weight at weaning of dairy calves". Researchers combined data from 13 studies that compared open-bucket feeding with other methods of feeding (bottle and nipple-pail, for example). They found no difference in concentrate intake or body weight at weaning; however, calves fed milk from artificial teats tended to have a higher average daily gain than calves fed from a bucket. Furthermore, researchers noted that while differences in growth were not statistically significant, different feeding methods may have implications on animal behavior (such as the stimulation of natural suckling behavior) that were not examined in this meta-analysis.

Abnormal Oral Behaviors

McDonald-Gilmartin et al., from the University of California-Davis presented "Development of abnormal oral behaviors in dairy cattle in the first 6 months of life". Researchers observed the rates of tongue rolling and non-nutritive oral manipulation of nonfeed items (NNOM) for 24 Holstein calves and 7 Jersey calves. Calves were first fed from a bottle before being bucket trained. Both tongue rolling and NNOM behaviors appeared more when calves were fed from the bucket rather than the bottle. This suggests that bottle-feeding allows for necessary oral stimulation, though it is unclear whether age is a confounding factor here. Abnormal oral behaviors were also highest during weaning. Finally, Jersey calves performed significantly more abnormal oral behaviors than Holstein calves. But this comes as no surprise to all the Jersey owners out there!

Individual vs Paired Housing: Long Term Effects

Finally, the subject of individual versus paired housing is still very prevalent and now research is showing the potential for long term behavioral differences associated with housing method. Clein et al., from the University of Florida Gainesville presented on "Effects of preweaning social housing on behavior of pregnant dairy heifers experiencing a housing change". This study looked at 40 heifers raised in either individual or paired pens during the pre-weaning period. Heifers were then intermingled and underwent the same standard farm procedures (which were not further described in the abstract) until four weeks pre-calving, at which time they were introduced to a freestall barn. Heifers individually housed before weaning spent more time in the stalls, less time eating, and had a higher likelihood of being displaced from their stall than heifers that were pair-housed. The results indicate the potential for pair-housed calves to have better adaptability in a competitive group setting as they head into their first lactation.

— Alexandria Bartlett
abartlett@whminer.com

FIXATED ON FIXATION: THE ROLE OF BACTERIA IN INCREASING THE N SUPPLY

Nitrogen (N) is the single most limiting nutrient for crop growth. It's the building block for proteins and a central component of the chlorophyll molecule which gives plants their lush green color. All plants need nitrogen, and yet, it's one of the most difficult nutrients to keep in the soil.

This is because nitrogen can leave the soil in several ways that most nutrients don't. Firstly, it is leachable. This means that it moves through the soil fairly easily (in nitrate form) and significant quantities will exit the field through drainage tile. Secondly, the ammonium and urea forms of nitrogen are susceptible to volatilization – where the N is converted to ammonia and escapes into the air. Then, there is the conversion of N right back to inert nitrogen gas through the process of denitrification. This occurs the most in wet parts of a field and is one of the reasons why the low spots often show symptoms of N deficiency despite adequate fertilization.

Though nitrogen may mysteriously vanish, it can magically appear as well. A lightning strike, for example, can literally zap nitrogen out of the air and this "poor man's fertilizer" gets carried down to the soil through rain. Experts, however, estimate that this process only generates a small fraction of the nitrogen that enters most ecosystems every year. So, where does the rest come from? Fertilizer is a given, but even an unfertilized hay field will continue to grow grass reasonably well until the P and K levels start getting low.

The answer is bacteria. Bacteria are the only organisms that have the nitrogenase enzymes necessary to actually add nitrogen to the soil – just as you do when applying nitrogen fertilizer. They provide the majority of nitrogen that is naturally introduced to the soil ecosystem each year. It is also primarily soil bacteria that are responsible for releasing the nitrogen that is contained in residues from manure or previous crops.

So how can we get soil bacteria to fix more nitrogen for us? Well, the easiest answer is "plant legumes," but it isn't a particularly revolutionary one. Legumes have gotten the reputation of being the nitrogen fixation heroes of the plant world, and understandably so, but it is the rhizobia bacteria they partner with that really get the job done. This is why it is always best to plant legume seeds that have been inoculated with an appropriate strain of bacteria. With their little root nodules, the plant essentially provides free room and board for the microbes in exchange for their nitrogen fixation services. This does, of course, cost the plant some energy, but it certainly seems to be a worthwhile trade for most leguminous crops.

Inoculants have recently been developed with the goal of augmenting or inoculating non-leguminous plants, such as corn, with free living nitrogen fixing bacteria strains. While fascinating from an experimental standpoint, the practical utility and effectiveness of these products is still unknown. We have tested several such products at the Miner Institute and plan to continue the research as time and resources allow.

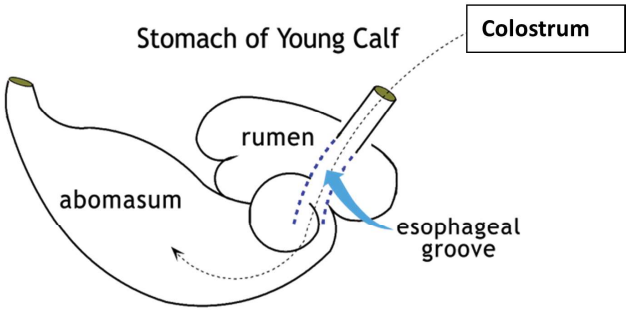
The most consistent thing we have found thus far is inconsistency. We have had cases where the products perform as advertised, cases where they appear to cause a yield drag, and a good number of cases where they just didn't seem to do anything at all. I'm sure part of this is just the nature of doing research with multiple groups of living organisms. Even the best of us two-legged organisms can be temperamental at times.

If you are as fixated on nitrogen fixation as I am and you want to start managing your farm to promote natural nitrogen production for corn, my suggestion is that you start by making efforts to improve the soil environment. The number one item I would address would be drainage, followed by compaction, pH, fertility, soil organic matter, etc. Once all these have been addressed, that's the time to start thinking about experimental inoculants and biological products. Though specific bacterial inoculants may be questionable, the value of soil bacteria in general is certain. The soil microbiome is a powerful force with tremendous potential to benefit agriculture. Stay tuned for more updates as we continue to learn more about this new world of biological possibilities.

— Allen Wilder
wilder@whminer.com

PASSIVE TRANSFER, NOT A PASSIVE REQUIREMENT FOR CALVES PART I: DELIVERY METHOD OF COLOSTRUM

Calf management and health is an important first step in growing healthy and productive dairy cows. Timely delivery of colostrum is essential to calf health since calves are born with no immunity. Within 24 hours after birth, the window for calves to absorb immunoglobulin (Ig) G (the primary immunoglobulin in cow colostrum) will close, making it a race against the clock starting the moment the calf is safely delivered. Industry recommendations suggest a first feeding of high-quality colostrum (Brix 22% or higher) as soon as possible, ideally within the first 2 hours of life.



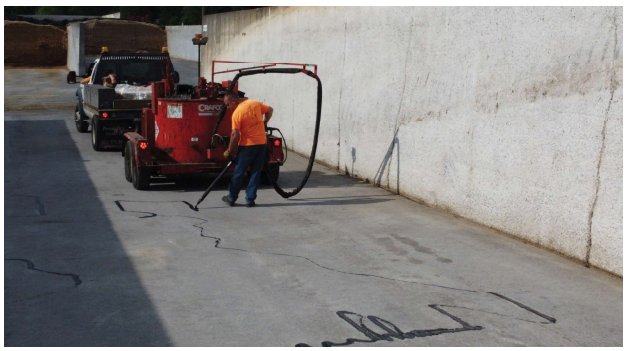
Adapted from https://www.mannapro.com/homestead/milk-replacers-guide

Does it matter how the colostrum is delivered? Nipple-feeding mimics natural feeding but relies on the calf to have an adequate suckle response and desire to eat. Esophageal tube-feeding is sometimes more time efficient and delivers a known volume. HOWEVER, tube-feeding requires training to be done properly and safely. Is there a difference between IgG absorption when calves are nipple-fed vs tube-fed the colostrum? That question is a good one since we know that milk fed to a calf via nipple bypasses the rumen, reticulum and omasum via the esophageal groove, empties into the abomasum and then passes into the intestine where IgGs are absorbed (see figure). When calves are tube-fed, the colostrum is deposited into the rumen and in theory, may have a longer distance to travel before absorption in the small intestine. A study conducted

See **COLOSTRUM**, Page 11

RESEALING BUNKER FLOORS AN IMPORTANT MAINTENANCE PRACTICE

We recently re-sealed the asphalt on our bunker floors. This is a process we aim to do every 3-5 years; it is an important step for maintaining feed quality and the longevity of the bunker floor.



The process is the same as having your driveway sealed and is done by the same professionals; it only works on asphalt surfaces.

The process is the same as having your driveway sealed and is done by the same professionals; it only works on asphalt surfaces. We do it during the spring, when the bunker is empty. The bunker is swept and blown out to ensure that the floor is as clean as possible. Then the cracks are filled and that sets for about 24 hours. The sealer is then sprayed over the entire bunk floor. The products used are environmentally friendly and safe for animals.

When the asphalt cracks, water comes up from the floor of the bunker and spoils the bottom layers of feed. The sealing prevents this from happening and preserves feed quality. The entire process takes about two days and requires dry weather but is a worthwhile investment for forage quality and bunker longevity.

Visit https://www.whminer.org/post/resealing-bunker-floors-an-important-maintenace-practice to see a video of the sealing process.

— Rachel Dutil
dutil@whminer.com

THE HOT TOPIC OF FEED EFFICIENCY

Alongside my colleagues I attended the annual American Dairy Science Association meeting in June. This is an exciting event in the world of dairy science, where people from all areas of the industry get together to discuss new research and innovative ideas.

A session that caught my eye was titled "Associations between body temperature and feed efficiency traits in Holstein cows", presented by L.C. Novo from Dr. Francisco Peñagaricano's lab at the University of Wisconsin- Madison. This group has done extensive work correlating genetic traits and feed efficiency, and this study has added the comparison of an on-farm measurable trait, such as temperature, to feed efficiency.

Feed efficiency is an integral measurement of productivity on a farm, defined as the amount of milk produced per pound of dry matter consumed. This is calculated by pounds of fat-corrected milk divided by pounds of dry matter intake (DMI). Although the calculation is simple, various internal and external factors can affect feed efficiency, such as genetics, forage quality, and weather. Industry benchmarks provided by Dr. Mike Hutjens report feed efficiency of fresh cows <21 days in milk (DIM) at 1.3-1.6, cows 21-90 DIM at 1.5-1.8, cows 150-200 DIM at 1.4-1.6 and cows >200 DIM at 1.2-1.5.

This research consisted of data from 304 mid-lactation cows in 11 feed efficiency trials between 2020 and 2023. They utilized automatic temperature loggers placed vaginally to record average body temperature, consistency of body temperature, and change in body temperature after the largest meal of the day. Feed efficiency traits were represented by measurements of DMI, metabolic body weight, secreted milk energy, and residual feed intake. Temperature was measured for 2 weeks and feed efficiency data was collected for 6-7 weeks for each cow.

Average body temperature was found to be positively associated with residual feed intake ($P<0.05$), meaning that cows with higher average body temperature had lower feed efficiency. When evaluating consistent body temperature, there was a positive association with milk energy ($P<0.05$), where cows that showed a greater variance in body temperature had higher secreted milk energy. Finally, when considering change in body temperature after the largest meal, there was a positive association with DMI and secreted milk energy ($P<0.01$). This association shows that higher changes in body temperature after the largest meal were consistent with higher DMI and higher milk energy.

Overall, we know that there are a multitude of factors that individually can impact feed efficiency and temperature. This study showed that temperature traits may be indicators of more than just sickness, but productivity as well. However, in an industry that is saturated with data, it can be beneficial to keep track of these numbers that are simple to calculate such as feed efficiency to continually assess the productivity of your cows, pens, or farm from a bird's-eye view.

— Taylor Turney
tturney@whminer.com

COLOSTRUM, Continued from Page 10

by Godden et al. in 2009, found that when feeding 0.4 gallons (1.5 liters) of colostrum resulted in higher IgG serum concentrations in nipple-fed calves vs. esophageal tube-fed calves. All nipple-fed calves (100%) had acceptable passive transfer rates while only 41.7% of tube-fed calves had acceptable rates. This same study found that when volume of colostrum was increased to 0.8 gallons (3 liters), there was no difference in serum IgG concentrations and 100% of calves had acceptable passive transfer rates regardless of whether they were nipple-fed or tube-fed the colostrum. A more recent study by Desjardins-Morrissette et al. (2018) showed similar findings when calves were fed the higher rate of colostrum (0.8 gallons or 3 L). In addition, they found there was no difference in abomasal emptying between the two different colostrum feeding methods indicating the colostrum left the abomasum and entered the intestine, where absorption occurred similarly for both feeding methods. So, why the difference in acceptable passive transfer rates between feeding methods when feeding rates were 0.4 gallons and not 0.8 gallons? Earlier work by Chapman et al. (1986) found that when calves were tube-fed, overflow into the abomasum occurred after ~ 0.1 gallons (0.4 L) was fed…indicating the rumen had a capacity to hold 0.1 gallons of colostrum. The remainder of colostrum fed passes directly into the abomasum and intestine for absorption of nutrients and IgGs. This may explain why tube-feeding higher rates of colostrum has similar IgG absorption to nipple-fed calves. With an increased use of colostrum replacers which recommend a feeding volume of 1.5 quarts, perhaps we should consider diluting the colostrum replacer more and increasing the volume fed if the calf is fed with an esophageal feeder. Bottom line: When considering different colostrum feeding methods, also consider increasing the feeding volume to 0.8 gallons when tube-feeding.

** References available upon request.*

— Robert Navaroli
navaroli@whminer.com

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

Miner Institute team and registered Holsteins at the 2024 Clinton County Fair.

Closing Comment

A bird in the hand is usually dead.

www.whminer.org
518.846.7121 Office
518.846.8445 Fax