FARM REPORT

In This Issue:

FROM THE PRESIDENT'S DESK: FOCUS ON FEEDING

Researchers at the University of Guelph have recently assessed the impact of feeding management on herd performance (Sova et al., 2013. J. Dairy Sci. online. 96:1-12). We know from European research (Bach et al., 2008. J. Dairy Sci. 91:3259) that ensuring 24-hour feed availability results in much greater milk production. Herds feeding the same TMR that allowed for feed refusals and pushed up feed more often out-produced other herds with similar genetics by 3.5 to 8.6 lb/cow daily!

The Guelph study focused on TMR feeding frequency, amount of feed refusal, and bunk space. They evaluated 22 free-stall herds with an average herd size of 162 cows. Information was collected on a group basis with an average group size of 83 cows. Some herds had only one group of cows, but if the herd had more than one group then the highest milk group was observed. Groups averaged 187 days in milk with a mean parity of 2.3 lactations; cows consumed 53.6 lb/d dry matter intake and produced 75.6 lb/d of milk.

What is fascinating about this work is that the researchers were able to measure the relationships between feeding management and group performance. For instance, twice per day feeding compared with only once per day was associated with an average increase of 3.1 lb/d of DMI, 4.4 lb/d more milk, and a 0.86 percentage-unit decrease in sorting against the long particles in the diet (measured as being greater than 19 mm with the Penn State Particle Separator). Feeding for lower refusal rates also was associated with less feed sorting on a pen basis. Sorting had a substantial impact on these cows: Every 2% greater sorting against long particles was associated with a 2.2 lb/d loss in milk yield. We know that drier diets and feeding for higher amounts of feed refusal typically results in more sorting. In contrast, a diet with more homogeneous particle size results in less sorting, but a diet with distinct larger and smaller particle fractions allows cows to more easily select the desired particles (usually the smaller particles that are higher in starch). Interestingly, greater milk yield was associated with less sorting for fine particles. Additionally,

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Alumni Corner

PREVENTING ANTIBIOTIC RESISTANCE SPREAD FROM DAIRY FARMS

Antibiotics are used daily in veterinary and human medicine, but their usage is a two edge sword as they are a primary driver of the global increase in antibiotic resistance. The term antibiotic originally referred to any agent with biological activity against living organisms, but the term now refers to substances with specific antibacterial, anti-fungal, or anti-parasitical activity.

Microbial resistance to antibiotics is seen as one of the greatest human health challenges of our time. In the U.S., recent estimates are that 70% or more of antibiotics used are administered to livestock, although systems for quantifying usage are inadequate. Antibiotics used therapeutically or subtherapeutically may contribute to antibiotic resistance of bacteria by affecting bacteria in the animal's digestive tract. These bacteria are then excreted in manure and the antibiotic resistance genes (ARG) they carry can persist in soil and be picked up by other bacteria. It is the genes themselves that are considered pollutants more than the bacteria that carry them. With manure or soil runoff, these genes may become widely distributed through the water supply.

A less often considered but potentially significant contributor to antibiotic resistance is antibiotics in soil and water environments. Antibiotics in manure and soil can select for antibiotic resistant bacteria and the ARG that they carry. Correlations have been identified between antibiotic use and sulfonamide and tetracycline ARG abundance in manure lagoons on U.S. feedlots and in Dutch soil, supporting the relationship between antibiotic use and environmental reservoirs of resistance.

The values and perceptions of consumers can directly impact on-farm practices if consumers choose to vote with their wallet or at the ballot box against food that is produced in ways that they do not approve. Antibiotic use in animal agriculture is clearly one of these hot topics, with growing consumer opposition to perceived unbridled use of antibiotics. Fortunately these same consumers tend to be very concerned about animal welfare, and the case for therapeutic antibiotic use is not difficult for the industry to make if some effort is made to address concerns about antibiotic resistance. Our current research focuses on identifying opportunities for high impact intervention balances farmers need for practical solutions with consumers' concerns about the contribution of animal agriculture to antibiotic resistance.

One example of the research done to address this question is a project we recently published evaluating antibiotic resistance gene abundance in feces of calves fed medicated or non-medicated milk replacer. Genes related to tetracycline resistance increased over time regardless of treatment, thus the calf gut itself appears to be an environment conducive to the proliferation of certain ARGs. Genes encoding resistance to antibiotics that were not administered were less abundant, but they were still present in the feces of these calves. Every calf in our study, even those never receiving antibiotic therapy, excreted millions of copies of genes coding for antibiotic resistance.

These results call into question the widely assumed dominant role of feed antibiotics selecting for ARGs; cross-inoculation between calves housed separately but in the same general area of the farm may have been a factor in the outcome. The results have important management implications, particularly with respect to defining organic dairy farming practices. Simply not feeding antibiotics did not prevent excretion of ARG. Thus, strategies that aim to manage the gut microbial ecology or to limit manure runoff may be more effective for limiting the dissemination of ARG than simple omission of antibiotics in the feed.

The obvious next question is what can be done to cost-effectively reduce or eliminate these antibiotic resistance genes in manure without impairing the ability of farmers and veterinarians to use antibiotics when necessary. Current research focuses on identifying what manure from what cows on what days must be isolated and treated in what way to prevent loading of antibiotics and antibiotic resistance genes from manure to the environment. Stay tuned for more results!

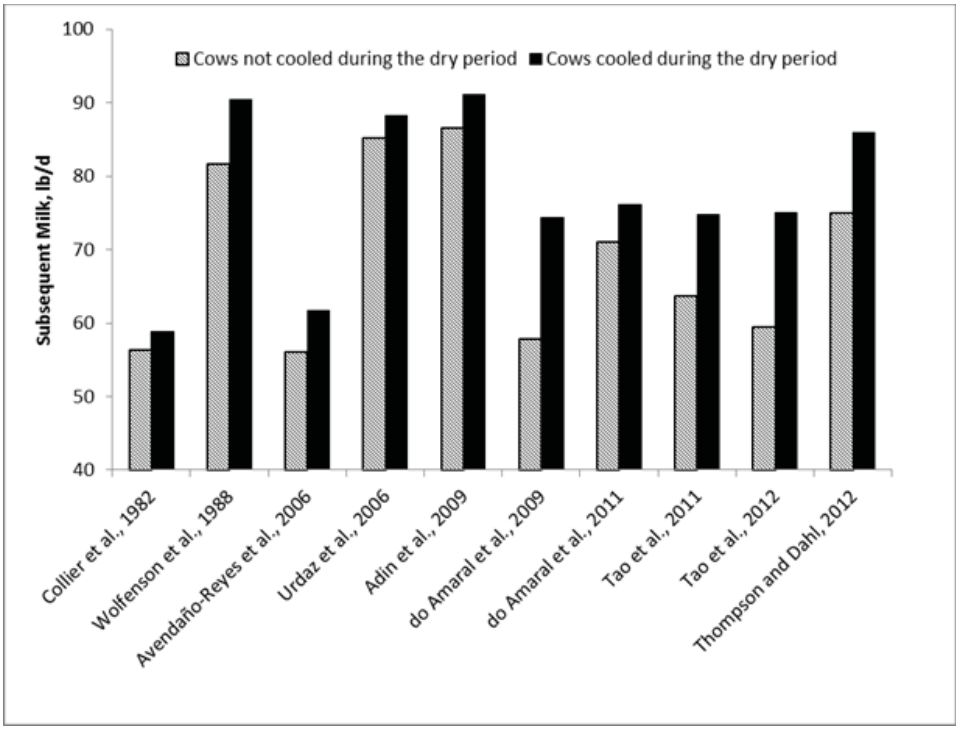
— Katherine Knowlton

The Miner Institute summer program was my first ever internship, in the summer of 1988. I remember good food, pretty cows, and lots of bug spray. I am now a professor in the Department of Dairy Science at Virginia Tech with primary responsibilities focused on research and teaching on environmental issues associated with animal agriculture. I collaborate with faculty, consumer groups, and government agencies to identify and implement cost-effective management practices which reduce the environmental impact of farms. Research activities focus on reducing potential losses of a variety of pollutants (e.g. phosphorus, antibiotics, antibiotic resistance genes) from dairy and livestock farms. I also lead the department's undergraduate program and teach four courses in dairy science, ruminant nutrition and environmental issues associated with animal agriculture. I am the assistant coach of the Virginia Tech dairy cattle judging team (three times national champions in the last 6 years!!!), and judge dairy shows across the US.

COOL DRY COWS TO IMPROVE TRANSITION SUCCESS

To the North Country's surprise we had our first bout of heat stress this year during the first week of May! Seven out of the first eight days of the month had a maximum temperature of 75ºF or greater. This short period of heat stress reminded us of the importance of heat abatement strategies for our cows and the need to do yearly maintenance on fans and sprinkler systems.

Signs that your dry cows are experiencing heat stress include rapid swallow breathing or open mouth breathing, sweating, decreased intake, and increased body temperature. A quick way to make an assessment is to take a rectal temperature from 10 cows. If greater than or equal to 7 of 10 cows have temperature about 103ºF, then cows are probably experiencing heat stress. In addition, if 5 out of the 10 cows or more have greater than 100 breaths per minute, the cows are experiencing heat stress. It's not too early to start thinking about heat abatement strategies for your dry cows this summer.



It's well known that heat stress can have negative effects on lactating cows. Common problems include decreased feed intake, compromised lactational performance, altered metabolism, and impaired reproductive performance. It is estimated to be a ~$900 million financial burden for the U.S. dairy industry. Fortunately, improvements in management through the use of cooling systems and nutritional strategies have alleviated some of the negative impact of heat stress.

However, the dry cow barn is often a low priority for cooling on many dairies. Dry cows shouldn't be neglected since they experience many of the same physiological changes as lactating cows under heat stress conditions, such as increased body temperature, increased respirations, and decreased intake. Our dry cows appeared reasonably cool and comfortable during our recent heat spell. Our dry cow facility has 52" fans installed about every 50' over the sand-bedded freestalls and 36" fans installed about every 32' at the feed bunk associated with the sand-bedded freestalls, the feed bunk associated with the bedded pack, and the bedded pack. We made the investment in fans expecting it to payoff in the subsequent lactation.

A review of several studies indicated that relative to heat stressed cows, cows that were cooled during late gestation had increased milk yield in the subsequent lactation (see figure). We realize that our cows probably experience less heat stress than cows used in many of the studies conducted in the southern U.S. However, we still expect a reasonable return on our investment because of greater transition success because of more mammary growth before calving leading to increased milk production in the subsequent lactation and improved immune status.

— Heather Dann
dann@whminer.com

* *Reference:* Tao, S., and G. E. Dahl. 2013. Invited review: heat stress effects during late gestation on dry cows and their calves. J. Dairy Sci. DOI: 10.3168/jds.2012-6278.

ARE MUNs IMPORTANT?

When I first started my post-doc at Miner Institute the research cows' milk urea nitrogen (MUN) concentrations had just spiked during the weekly test. After a week or so the MUN concentrations returned to normal without any intervention on our part, begging the question why did they spike and more importantly why was this increase such a topic of discussion? Though we still haven't narrowed down the reason behind the spike, this incident brought up several valid questions including why we care about MUN concentrations and what they mean for the future of the dairy industry.

Milk urea nitrogen is a measure of how each cow utilizes the protein supplied in her diet, but how we arrive at a meaningful number involves a number of steps. Protein supplied in the diet is ingested by a cow and passes into her rumen. Once the ingested protein arrives in the rumen, a portion is utilized by the rumen microbes while the other portion, not utilized by the microbes, is broken down into amino acids in the small intestine and then shuttled via the blood for use by various organs. Amino acids not used are converted to urea which then equilibrates with blood, urine, and milk. Since milk is easy to collect in lactating dairy cows, measuring milk urea nitrogen has become an industry standard for determining how well a cow is utilizing dietary protein supply, with a lower MUN concentration correlating to efficient use of ingested protein when protein supply is adequate. Typically MUN concentrations become elevated when rumen degradable protein or rumen undegradable protein is fed in excess or when rumen degradable protein and non-fiber carbohydrates are unbalanced.

As MUN concentrations are correlated with nitrogen balance and dietary nitrogen content it's long been considered an indicator of proper protein feeding management. However, there are other factors that influence a cow's MUN concentrations, and recent data (Aguilar et al., 2012) suggests that cow phenotypes may be an important factor. These phenotypic differences were not correlated to nitrogen intake, milk yield, or other production-related factors. Furthermore, research by Mitchell et al. (2005) suggests that there is a genetic component as MUN concentrations are heritable and have an effect on cellular urea transporter activity. Though this may appear to be dissecting MUN concentrations down to the cellular level with a microscope, what's key to consider is the impact these differences may have on herd to herd comparison of MUN concentrations and the environmental impact of interpreting these differences.

As the dairy industry moves into a future with the potential for tighter regulations on its environmental contributions, we must be hesitant of blanket considerations regarding indicators of utilization and therefore excretion of target nutrients, especially nitrogen. Reductions in dietary protein to meet a target MUN value may be detrimental for some herds, while beneficial for others. To illustrate this point, Aguilar et al. (2012) suggest that a herd with a high MUN value (17.3 mg/dL) would need to reduce a typical diet with 17.8% crude protein by almost 5 percentage units in order to achieve a target MUN concentration of 12.0 mg/dL. For most herds this 5% reduction in crude protein would be unachievable without a subsequent loss in production and therefore profit. As the possibility of regulations for target MUN concentrations increases, the dairy industry and others must realize that a "one for all and all for one" approach is not applicable. However, each herd should undergo its own calibration period where all possible factors that contribute to urea circulation and therefore MUN concentrations are considered in order to determine if the herd is meeting its own target MUN concentration. Using this approach may be a meaningful way to balance the needs for productivity in the dairy industry while maintaining the sense of environmental stewardship that so many farmers appreciate and possess.

— Heather Tucker
tucker@whminer.com

**Selected References:*
Aguilar, M., M. D. Hanigan, H. A. Tucker, B. L. Jones, S. K. Garbade, M. L. McGilliard, C. C. Stallings, K. F. Knowlton, and R. E. James. 2012. Cow and herd variation in milk urea nitrogen concentrations in lactating dairy cattle. J. Dairy Sci. 95: 7261-7268.
Mitchell, R. G., G. W. Rogers, C. D. Dechow, J. E. Vallimont, J. B. Cooper, U. Sander-Nielsen, and J. S. Clay. 2005. Milk urea nitrogen concentrations: Heritability and genetic correlations with reproductive performance and disease. J. Dairy Sci. 88: 4434-4440.

Is there something you would like to know more about?
Send *Farm Report* article suggestions to Rachel at dutil@whminer.com

MORE ON MUNS, MINER HERD AND RESEARCH EXPERIENCES: SOME "VERBAL RESEARCH"

Following up on Heather Tucker's MUN article and discussion of our recent spate of higher MUNs in the whole herd and particularly our two most recent lactating cow trials: Our DHI test results for the past 12 months shows that our herd MUNs increased from 12 to 15 mg/dL from May 2012 to April 2013. Whole herd milk remained steady at about 95 lbs, milk fat rose slightly from 3.6 to 3.8% and milk protein increased 3.0 to 3.1 (almost 3.2). Do we dare conclude that higher MUNs will result in gains in milk components? Probably not, but what other possible causes can there be for increased components as well as increased MUNs?

Over the past 12 months we have conducted at least three lactating cow trials with various treatments in each that required slight diet modifications relative to the herd high cow rations. So, it's difficult to assess whole herd MUN levels without considering the individual research diets and treatments. Let's first review the classic causes of elevated MUN levels.

- Too high dietary: ("too high" relative to fermentable CHO)
- CP
- Soluble P
- RDP
- NPN
- Too low dietary rumen fermentable carbohydrate (CHO) in the forms of sugar, starch, or digestible fiber

All of the research and herd high-cow rations were formulated for early lactation cows, >100 lbs milk, >60lbs DMI, 16-17%CP, 10% RDP, 24-26% starch and >5% sugar. For all cows, the main herd and the research groups, forages were the same except for one corn hybrid fed separately to 16 cows. We increased forage in these rations to 57-60%. The grain mixes were very similar between the main herd and the research groups except for an increase in RDP by increasing SBM in exchange for corn germ meal. All rations contained a blend of urea and Optigen (slow release urea) at similar percentage of diet DM. Diets looked good on paper both in CPM 3.0 and CNCPS 6.1

However, upon further review of post-trial forage, feed and TMR analyses we found that our RDP values were higher than originally formulated, over 11% in some cases. Relative to the moderate level of starch in these diets 23-26%, looks like we exceeded the balance of RDP to rumen fermentable carbohydrate resulting excess rumen available N and higher MUNs. Though these two trials alone cannot account for the gradual increase in whole herd MUNs we have seen over the last 12 months. I still wonder if something else is going on.

Here are some thoughts that come to mind:
1. Forage starch levels decreased as we fed deeper into CS and BMR piles thereby feeding earlier-harvested CS from the droughty 2012 crop year.

2. Starch degradability did not show the classic spring increase due to length of steeping in silage juices.

3. Our "Canary Group", Pen 3, mostly 1st calf heifers, a relatively untouched group, truly managed only as herd group with consistent diet and social grouping also showed increasing MUNs for the year. So, not just the research diets.

4. NPN sources. We feed both urea and Optigen (rumen protected slow release source of urea). The level of each was relatively constant across research and herd rations. Is it possible that in high DMI cows (>65 lbs/day), with highly digestible forage resulting in higher rumen passage rate, that some of the slow release product was flushed to the lower gut before it was released. Is it possible that this urea was released in the small intestine or hindgut where fermentable CHO is limiting and the N was absorbed, resulting in excessive N in blood requiring excretion via MUN? Just a thought.

In summary, we're not sure we really can explain the higher MUNs just yet, but this certainly indicates the need to accurately assess both starch and protein degradability in feeds and diets in order to maximize ruminal fermentation and utilization of N. I do feel safe in attributing our increases in milk components to higher forage diets.

Happy Dairy Month.

— Kurt Cotanch
cotanch@whminer.com

Come visit the Heart's Delight Farm Heritage Exhibit at Miner Institute!

Open Weekdays from 9 a.m. to 3 p.m.
May through October
www.whminer.org/heritageexhibit.html

COLOSTRUM REPLACER PRODUCTS: A PRELIMINARY SUMMARY OF 13 STUDIES

Colostrum management is the most important thing concerning calf health by provision of passive transfer of immunity (PTI). The concentration of serum IgG > 10 g/L at 24 hour of birth is widely used as the criteria for adequate PTI. Typically, feeding 3 to 4 L of high quality colostrum within 2 hours after birth will do a good job at achieving PTI. If you are testing with a colostrometer on-farm, a reading of > 70 g/L is generally a safe number ensuring at least 50 g/L of IgG in your colostrum.

Running short of colostrum may happen on many farms either due to seasonal calving, poor quality, or concerns about transmission of Johne's disease. There are many brands of colostrum replacer products on the market that could be used as a source of IgG. Typically, these colostrum replacers can be categorized based on IgG source as either plasma-derived or colostrum-derived. Research with these colostrum replacers have produced mixed results regarding their efficacy. To better understand the data, I summarized 13 studies conducted after 2000 (12 published and 1 study with unpublished data from Miner Institute) with 48 treatments comprising 10 for maternal colostrum (MC), 22 for plasma-derived colostrum replacer (PDCR, containing at least 100 g of IgG per dose), 11 for colostrum-derived colostrum replacer (CDCR) and 5 for plasma-derived colostrum supplement (PDCS, containing < 50 g of IgG per dose). This preliminary summarization should give a holistic view of the effect of colostrum replacers from different sources on IgG absorption and relationship with serum total protein.

IgG absorption efficiency of colostrum replacers products

The big concern of using colostrum replacer products may be how much should be fed and how efficient the IgG will be absorbed. As shown in Figure 1, all treatments using PDCR or PDCS at the amount providing 100 g of IgG or less failed in PTI (10 g/L of serum IgG) and about half of the studies using CDCR providing ~100 g IgG were sufficient to achieve PTI. However, when IgG intake increased to > 150 g, all calves fed CDCR products had adequate PTI across studies, whereas calves from most studies feeding PDCR or PDCS had adequate PTI, but a relative lower serum IgG concentration than those fed CDCR and still had higher risk of failure PTI, which may be due to variations in management practices among studies. The data shown in Figure 2 indicated that PDCR products were associated with relatively lower IgG apparent efficiency of absorption (AEA) compared with CDCR when evaluated at the same

See **COLOSTRUM**, Page 10

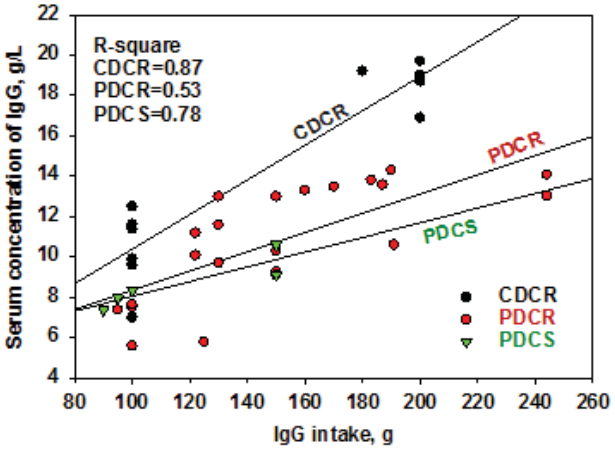


Figure 1. Relationship between IgG intake and serum concentration of IgG for CDCR, PDCR, and PDCS. Each symbol (either solid circle or triangle) represent the result of one treatment from 13 studies. A line of linear regression was simulated to predict the relationship for each category of product (A higher R-square indicates a better fit of the data.)

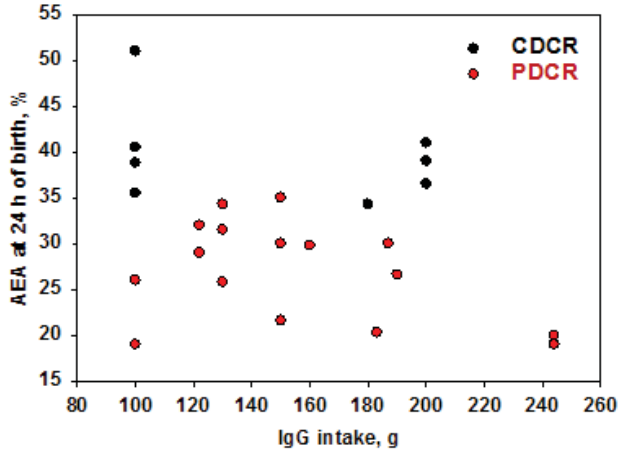


Figure 2. The distribution of apparent efficiency of IgG absorption (AEA) at 24 hour after birth for different amounts of IgG intake from colostrum replacer products.

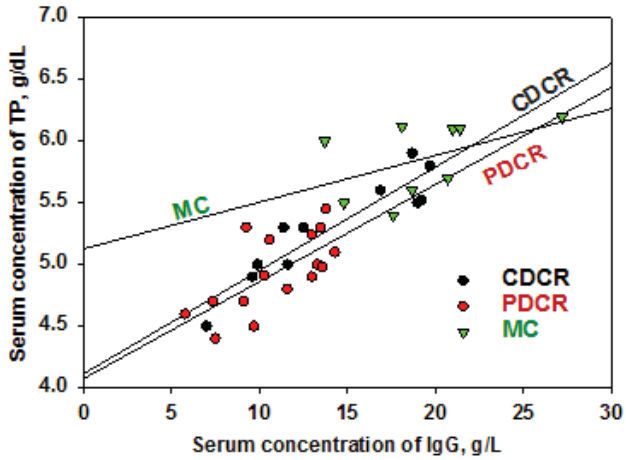
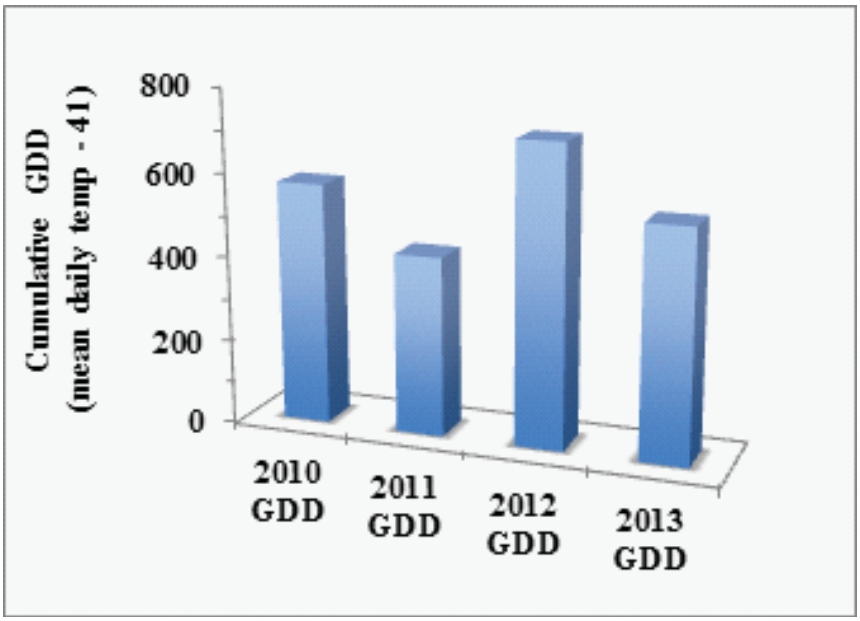


Figure 3. The relationship between serum concentrations of IgG and total protein (TP) of calves when MC, CDCR, and PDCR were fed.

FINE-TUNING THE 2013 HAY CROP HARVEST

The 2013 cropping season is off to a good start in Northern NY. After a somewhat chilly April, temperatures jumped up to above-average the first week of May. This coupled with a fairly dry spring has allowed farmers to work fields early this year and get spring seedings in the ground and corn planted. At the Institute, the Crops Crew has been busy with fieldwork since April. After seeding down 85 acres of new alfalfa-grass, they started planting corn and had all 300 acres planted on May 17- the earliest the farm has ever had their corn planted according to Ev and Jake. A big thanks to our Crops Crew and Dairy Barn staff for making this happen!

Taking the time to fine-tune your first-cutting harvest management plan will pay the farm back at feeding time. First-cutting can represent as from 40 to as much as 70% of your total dry matter yield for the year, so getting it right is important. Remember that maturity at harvest is the single biggest factor affecting overall forage quality due to its strong influence on fiber digestibility and nutrient content. Harvesting grass fields for lactating animals at the boot stage maximizes digestible fiber and nutrients. Your target for NDF level (%) at harvest for grass and mostly grass fields should be around 50 to 55%, whereas 40% NDF is the target for alfalfa. For heifers and dry cows, you can go for more yield and less quality so harvest timing is less critical.



While plant growth stage is a good indicator of when to harvest, using %NDF is an additional measure to fine-tune harvest timing. Depending on forage species and growing environment, the rate at which NDF increase with time varies. Work by Sid Bosworth and colleagues at UVM showed that grass NDF increased at an average rate of 0.5%/10 growing degree days (where GDD = mean temp. - 41°F). For alfalfa fields, they showed that it took approximately 700 to 750 GDD for alfalfa to reach ~40% NDF.

As of May 21, approximately 545 GDDs have accumulated since March 1 in Chazy (see figure). We sampled six grass fields on 5/13 and again on 5/20 one week later (five fields dominated by tall fescue and one by reed canarygrass). On average, there was an increase of 0.9% NDF/10 GDD across the fields.

Hopefully your farm has planned for a timely first-cutting harvest. While harvest timing is critical, don't forget the other details like harvesting at the optimum moisture content, merging, packing, and keeping an eye on the weather. Take advantage of this spring's weather in the Northeast and make the most of your first-cutting harvest.

— Eric Young
young@whminer.com

FOLIAR FUNGICIDES FOR CORN

You've probably read farm magazine articles about foliar fungicides for corn. We last wrote about this topic here three years ago but these products have been around since 2006, with recent claims about big yield increases even in the absence of disease symptoms. In fact, Headline® fungicide is labeled for improvements in plant health.

Foliar fungicides are more likely to be economical when disease-susceptible hybrids are planted into minimum till, corn-on-corn fields and during humid summer weather. Stover on the soil surface means potential disease spores to infect corn. This is noteworthy since corn harvested for silage doesn't leave much except 6" to 10" of stubble. Ohio State University plant pathologists evaluated foliar fungicides, including over 200 replicated grain trials in 14 states over a period of 8 years. The likelihood of an economic response ranged from 25% to 65%, depending on the fungicide used and assuming the lowest application cost of about $16/acre. (Fungicide plus application typically costs about $30/acre.) The Ohio State study also assumed a $7/bushel price for corn, which is higher than what we're likely to see in the coming year.

Where do foliar fungicides fit in Northeastern corn production programs? There's almost no data for the Northeast, and very little data anywhere for corn harvested for silage. Some farmers in Pennsylvania growing BMR corn apply foliar fungicides because they think that BMR is more susceptible than are other hybrids. Penn State agronomist Greg Roth found a lot more Northern Corn Leaf Blight on one or more BMR hybrids in his 2012 corn silage hybrid trials. Ohio State plant pathologists don't recommend foliar fungicides when disease risk is low. However, there's a practical consideration: These fungicides should be applied between tasseling and silking. Is there a custom operator in your area equipped to apply fungicides on corn that's at least 6 feet high?

— E.T.

A TOUGH TIME TO BE A GRAIN MARKING ANALYST

These are not good times for grain marketing analysts, who regardless of whether they consult detailed supply-demand charts, flip a coin or examine the entrails of a chicken may wind up very wrong on their price forecasts. We know what corn and soybean carryover is — not a lot — and we'll know about what the planted U.S. corn and soybean acreage will be, but almost everything else is at the mercy of the weather.

Using what USDA predicts will be the planted acreage, a slightly below-average corn crop of just under 160 bushels/acre would produce a 14 billion bushel crop, resulting in increased stocks and an average price of about $6. If yields wind up 5-10% below normal this would produce about a 12 billion bushel crop, a very tight supply-demand balance and prices that could top out at over $8, an all-time record. But if all that corn got planted that farmers said they'd plant and the major corn-growing areas get great weather, the national average yield could reach 170 bu/acre or more and we'd have a 15+ billion bushel crop with prices in the $4/bu range. So, a 25% difference in total corn supply (from slightly under normal yields to a bumper crop) could translate to a 50% difference in corn price. These days it's much safer to be an agricultural economist, explaining what just happened, than a marketing analyst trying to predict what lies ahead when the biggest price determinant is the one thing over which he/she has absolutely no influence.

— E.T.

MINER INSTITUTE CUTS A WIDE SWATH

Since I retired from Miner Institute my main connection to the Institute is this newsletter, so it's acceptable to toss a bouquet to its research staff. In April I gave a presentation at "Expo Leche," a large three-day dairy conference held each year in Aguascalientes, Mexico. In their talks at least three of the other speakers alluded to the results of research at Miner Institute; in fact the Institute was referenced more than was any university. It's nice to see the efforts of the research staff recognized, and for them to realize that what they're doing is making a difference.

— E.T.

THE 4R INITIATIVE

In recent years The Fertilizer Institute has expanded its efforts on the "4R" initiative for fertilizer: Apply the Right Product at the Right Time at the Right Rate in the Right Place. In the April *Farm Report,* Eric Young provided a good overview of each "Right." Of course the 4 Rs are also suitable for a number of other applications including herbicides (and, for that matter, Preparation H®).

Fertilizer product, timing, rate and placement are all prominent topics in field crop news these days. Following are several you may have been reading about:

Nitrogen stabilizers. These include Agrotain® and NutriSphere-N®, both formulated for use with the liquid N (UAN) applications that are very popular in the Northeastern U.S. At Miner Institute we've used Agrotain® in both topdress (grass) and sidedress (corn) UAN applications and think it well worth the modest cost. You pay dearly for N fertilizer; why not spend a little more and have it there when the plant uses it?

Popup fertilizers. In some field trials a low rate of popup fertilizer increased corn yield, while in other trials it had no impact. This past year a high rate of popup fertilizer actually decreased yields in some cases, probably due to a salt effect under very dry soil conditions. My preference is a 2" x 2" band for corn starter fertilizers, but we need to keep our eyes open on this topic.

Nitrogen rates. Improvements in products, application methods and corn hybrids have combined to make nitrogen more efficient, so much so that university agronomists have reduced their nitrogen recommendations for corn. Compared to a generation or so ago, today's corn is producing much more yield per pound of N fertilizer. Few industries have improved efficiency more than has agriculture, a fact we should be publicizing to the non-farm community.

A buyer's market for potash. The potash market is oversupplied so this may be a buying opportunity, especially if high prices in the past few years caused you to reduce potassium use. Prices may bottom out this summer, prime time for topdressing alfalfa. Corn harvested for silage removes a lot of potassium from the soil, so if you have corn land that doesn't get manure consider buying 0-0-60 soon and apply it (according to soil analysis recommendations of course) after the corn has been harvested but prior to any fall tillage. If soil test P is also low consider using 0-10-40 or a similar blend containing phosphate.

— E.T.

FEED, Continued from Page 1

efficiency of milk production decreased by 3% for each 1% increase in sorting for fine particles which may reflect an elevated risk for low rumen pH and consequently lower feed efficiency.

Increasing feeding frequency of TMR from one to two times daily promoted greater feeding time and a more consistent distribution of meals throughout the day. We all know the rumen benefits of more equally spaced meals: lower risk of subacute acidosis, lower diurnal fluctuations in pH, and potentially better fiber digestion and dry matter intake. Even though there is a benefit of feeding TMR twice versus once daily, the benefits of even greater feeding frequency are still debatable. Last year I reviewed the literature and found that milk yield actually decreases when TMR feeding frequency is 3 times/day or greater and is linked with a reduction in resting time.

A 4 in/cow increase in bunk space was associated with a 0.06 percentage-point increase in milk fat and a 13% reduction in somatic cell count. We would expect that the improvement in milk fat relates to improved feeding behavior and rumen fermentation. Here's a thought-provoking finding: Use of headlocks was related with a 43% decrease in SCC versus post and rail feed barriers. We know that headlocks provide more protection from competitive displacement at the bunk, especially with overcrowding. Could it be that cows lie down more quickly in competitive environments and increase their risk of mammary infections? This finding needs more work to determine if it is repeatable and is something for farmers to be concerned about.

Here's one more useful finding: we understand that water is the most important (and too often neglected) nutrient – and this study highlighted its importance. For each 0.8 in/cow increase in water-trough space, milk increased by 1.7 lb/d.

The bottom line: feeding practices that ensure feed accessibility throughout the entire day promote greater feed intake, milk yield, and efficiency of production. These on-farm data accentuate the importance of never losing sight of the fundamentals of feeding management.

— Rick Grant
grant@whminer.com

WHAT'S HAPPENING ON THE FARM

The quietness of the winter months is over and things are gearing up for a busy summer. Between normal farm stuff, students, research and the beginning of cropping it has been busy at the farm. The close-up pen is full and cows have been calving left and right – most of them calving on their own, though, with very few dead on arrival. Our four summer interns arrived in late May and they are getting used to the routine of the farm as they work alongside us. They come with different levels of dairy experience and from all over – Indiana, Florida, New York and Puerto Rico. We have also been getting prepared for showing this summer – setting up separate pens and picking out heifers, tweaking their diets so that they will look their best come July.

A group of calves in our greenhouse barn came down with pneumonia – maybe the 20-30 degree temperature swings had something to do with that! Two pens of 5-9 month old calves broke with coccidiosis but with our veterinarian's guidance and treatment recommendations, both groups are doing better now. We have had lots of pen moves in the barn this last month with two research studies going on and we are working with the research staff as they prepare for two more studies. Still the cows have been averaging between 90-92 lbs. of milk with a 3.8% butterfat and 3.1% protein. The 150 day pregnancy rate is 25% and the somatic cell count has stayed below 160,000 for the year. As summer approaches we know we will probably be dealing with more mastitis. Just at the end of May we had to treat several cows (too many cows) for mastitis – some come right back to normal production within a day while a few will end up going to the sale when the drug residues clear. One of our best producers (peaking at 170 lbs/day) got mastitis last week and despite aggressive treatment, she isn't going to come back. I hate that – a great cow – productive, nice conformation and we lost her. We don't want our readers to somehow think things are falling apart with the herd, but rather share with you that our farm has its challenges just like many other dairy farms!

We put in long hours these last couple weeks but I love the challenge of being a herdsman…lots of things going on at the same time, paying attention to the cows to catch problems early before they escalate, taking care of details to keep the herd healthy and productive. There are those discouraging days where I feel like all I do is deal with issues that could escalate into big problems. Fortunately those crazy days don't come too often.

In early June we will be hosting two big events at Miner – Farm Days for Fifth Graders and the Cornell Nutrition Short Course. And we will be in the middle of first cutting. The sun has finally made an appearance after a week of rain (we really needed it though!). But now it's time for a stretch of warm sunny weather so we can get mowing!

— Anna Pape
pape@whminer.com

COLOSTRUM, Continued from page 6

amount of IgG intake. It seems that 30-40% of AEA is a decent level for most colostrum replacer products from both sources. Therefore, it seems feeding CDCR at the dose providing > 150 g IgG most likely to guarantee the successful PTI for your calves, but you may need to be more cautious if use PDCR at similar dose due to greater variation in performance.

Treatment	Equation	R-square
CDCR	[TP, g/dL] = 0.084 × [IgG, g/L] + 4.12	0.85
PDCR	[TP, g/dL] = 0.079 × [IgG, g/L] + 4.08	0.46
MC	[TP, g/dL] = 0.038 × [IgG, g/L] + 5.13	0.24

Table 1. Linear regression equations for serum concentrations of total protein (TP) and IgG for MC, CDCR, and PDCR products.

Relationship between serum total protein and IgG when using colostrum replacers products

It is widely accepted in industry that a serum total protein concentration of more than 5.2 or 5.5 g/dL at 24 hour of birth is a good indicator for adequate PTI (serum IgG > 10 g/L). However, some studies showed that calves may already have adequate PTI at a lower level of serum total protein when colostrum replacer products are used rather than colostrum. As shown in Figure 3, if you draw a vertical line at the point of 10 g/L IgG on the X-axis, the cut-off value for maternal colostrum was around 5.5 g/dL serum total protein, which is consistent with common recommendations, but it was below 5.0 for both CDCR and PDCR. Based on regression equations (Table 1), serum total protein should be higher than 5.0 and 4.9 g/dL to achieve PTI for CDCR and PDCR products, respectively.

Besides total IgG mass, other factors that varied among several studies may also affect absorption efficiency including time, method, and volume of colostrum replacer feeding. These factors were not taken into account in the analysis, which was the limitation of this preliminary summary.

— Peng Ji
ji@whminer.com

* References available upon request.

SAMPLING SILAGE

A recent article by Mycogen Seeds' Phil Krueger was a good reminder of the importance of properly sampling silage. Following are a couple of his suggestions, plus some comments of our own.

Taking a truly representative sample of the silage in a bunker or stack is virtually impossible since in almost all cases the silage represents multiple fields, crop varieties, and harvest dates. What you need is a sample that reasonably represents the silage you're feeding today --or when the results come back. For obvious reasons the more silage you feed, the more often you should take samples. Don't take grab samples directly from the silo face, especially one that's more than ten feet high. Farmers, farm workers and dairy nutrition consultants have been killed doing this. From personal experience I know that there's often no warning before several tons of silage comes crashing to the ground. Sample from the entire feeding face, waiting until the silage has been removed from the face. Put your hand into the silage pile and withdraw a subsample. Collect multiple subsamples and mix in a pail or other container, then remove about a pint of silage to send to the lab.

Taking a representative sample is just the start. Put the sample in a plastic bag, squeeze as much air as possible from it, and seal securely. Some farmers use one of those inexpensive household vacuum sealers. For nutrient analysis, refrigerate (but do not freeze) the sample until it's time to mail or ship to the forage lab, choosing a shipping date and carrier that will avoid having the sample arriving on a weekend when it may sit around for a couple of days. Don't simply label the sample "#1" or "#2" (unless that actually represents the silo number) since after setting the forage analysis aside for a while you may forget where it came from! Include which silo and the forage type.

"Paper or plastic"? Some forage labs recommend that silage samples submitted for yeast, mold and mycotoxin analysis should be shipped in paper bags. However, when we asked the labs for data supporting this recommendation they had none, were simply repeating something they must have read somewhere. So we did a study at Miner Institute comparing silage packaging alternatives including a variety of handling methods. Obviously paper isn't recommended if you want a dry matter or fermentation analysis, but for mold and mycotoxin analysis we found that silage stored in plastic bags at room temperature would have the smallest change in mold count from sampling to arrival at the testing lab. Do not freeze samples that will be analyzed for yeast and mold analysis — freezing greatly reduces mold counts. Ship these samples in plastic bags, in a container with a coolant pack to prevent heating. And don't be a penny-pincher about shipping method — quicker is better!

Finally, about sampling from silage bags: Do not sample through the side of the bag. There are several suggested methods for doing this. None of them work, and all can result in a depressingly large area of spoiled silage that you won't know about until you come to it while feeding out the silage. Sample only from the silage face, and remember that large farms may remove several feed of silage per feeding so the silage fed on the day that the forage analysis comes back may be somewhat different than that represented by the analysis. This is particularly true with second and later harvests of hay crop silage. That's why at Miner Institute we label the silo bags with field ID and harvest date.

— E.T.

GOOGLE EARTH AND SOIL WEB

How would you like to have a soil map of your farm right on your computer desktop? And for free. All you need to do is to download "Google Earth," then use the following link and download "Soil Web" as an overlay on Google Earth. http://casoilresource.lawr.ucdavis.edu/soilweb/ It's really simple! You can turn this overlay off when you want to use Google Earth for other purposes. The overlay will display the letter symbols of each soil type, but in the "Places" section on the left of the screen you can select "Major…." and get the actual names of each soil type. Then by clicking on a soil type a pop-up provides the soil profile, and by selecting the soil name on the pop-up you can get more detailed information on that soil than you'll probably ever use. This is really neat stuff!

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

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The only problem with troubleshooting is that sometimes trouble shoots back.

www.whminer.org
518.846.7121 Office
518.846.8445 Fax