High producing cows can become heat stressed at a temperature-humidity index (THI) of only 68. Heat stress causes negative behavioral, productive, and health changes in dairy cattle. An increase in air temperature from about 78 to 104°F reduces eating by 46%, ruminating by 22%, and boosts standing by 34%. Unsurprisingly, higher producing cows (>70 lb/cow/d) are typically more sensitive to heat stress than lower producing cows, especially for resting and standing activity. Unabated heat stress reduces feed intake by up to 35% or more. Even on well-managed dairies, heat stress can easily reduce intake and milk yield by 10-15%.

We now understand that body temperature mediates the cow’s standing and lying response to varying conditions of heat stress. Cornell researchers found that during heat stress conditions, core body temperature controls whether the cow lies down or stands. The cow will stand up once her temperature reaches ~102.0°F and won’t lie back down again until her core body temperature drops to ~100.9°F. Research published earlier this year by Arizona and Missouri researchers confirmed that cows with elevated core body temperatures stood longer and rested less.

So, the best way to get a heat-stressed cow to lie down in a comfortable stall and make more milk is to cool her body temperature. Because highly productive cows become heat stressed at a THI of only 68 or so, we need to implement more aggressive and creative heat stress abatement strategies than traditionally used. Increasingly, we understand that the focus of heat abatement needs to encompass the resting as well as the feeding area.

At Miner Institute we have observed greater resting time in the stalls and more rumination during episodic bouts of heat stress when we evaluated a heat abatement system (Cow KühlerZ, Marietta, PA) that cooled cows in the stalls with fans and water in addition to the typical cooling over the feed alley. Fans and sprinklers over the feed alley cool the cow, but there is also the risk that cows will spend too much time loitering in the feeding area without eating. Consequently, they are likely to short-change the time they need to spend lying down in a comfortable stall. A system that could effectively cool the stalls and the feed line ought to be ideal because it would optimize both feeding and resting behavior. And as a
Precision dairy farming (PDF) technologies measure physiological, behavioral, and production indicators of individual animals that will help dairy farmers improve management strategies and overall efficiency. Precision dairy farming technologies are commonly used for estrus detection. Automated estrous detection can decrease interinsemination intervals. Previous research is prevalent in defining the time of estrus with increased walking activity, increased mounting activity, milk temperature, increased vaginal temperature, slight increased ear skin temperature, tympanic temperature, decreased rumination time and decreased or low progesterone levels in blood and milk.

However, previous research is limited in using multiple PDF technologies for automated estrous detection at once on the same group of cattle in the same time period and location. Researchers at the University of Kentucky are doing just that with 9 different PDF technologies. The common question from dairy producers is “Which technology or parameter is the best in detecting cows in heat?” Final analysis on the study is not complete to answer this question. Yet, there has been continuous learning of the ins and outs of each technology. Below are things learned throughout this project.

1. Things to consider when choosing an automated heat detection system:
   - Durability of Device – how long will the device last in cow manure and the life of a cow?
   - Use Interface – How are alerts and graphs presented to the user and does the system work with PCDART or DairyComp305?
   - Parlor System – Is the device used to check cows into the parlor to record milk yield information?
   - Purpose of Device – Is the device only for heat detection or health monitoring as well?
   - Customer Service – Who can be contacted and how fast can an issue be resolved?

2. Record keeping is key!

See HEAT DETECTION, page 10
Our Summer Experience in Farm Management students arrived in mid-May and are excited to work at the farm alongside the dairy staff. It’s hard to believe that 10 years ago I was one of those students. Yes, my first experience at Miner Institute was in 2005 when I came the summer between my junior and senior year of college. After I graduated in 2006 I returned as the year-long herdsman intern…and then was hired to stay on as the full-time herdsman.

There are many recollections and stories from those first years at the Institute that stand out in my memory. I was excited beyond description to be working on a large dairy farm in New York (which was a big dairy state compared to my home state of New Hampshire). Cows calving almost every day, a variety of sick cow issues to learn about and treat, big tractors with a cab, AC and a radio, the pressure and fast pace of work during harvest. Despite the busyness of the farm, the people who work here were ready and willing to let this inexperienced young woman help with their work. They taught me what to do, explained things and patiently let me try it out and learn on the job. I quickly realized that not everything I had learned in college was going to work in the real world. Don’t get me wrong; I was so glad for that foundation of science and dairy management that college had provided…it was invaluable, but I still had a lot to learn.

When I first came to Miner Institute we had dry cows in what is now the heifer barn. Cows that were close to calving would be moved from the freestall into a maternity pen for delivery. I knew nothing about delivering calves when I arrived at the farm. Patently, Steve, Ralph, and Bethann taught me how and when to assist with a calving. “Put a glove on and feel this” they would say. I would fumble around with a chain loop inside the birth canal, trying to place it around the slippery foot of a calf. Sometimes they would have to take over and finish for me, but slowly I learned techniques for a smooth and quick delivery.

And so it went with many other jobs around the farm. I remember milking that first summer with Shaun and Neil (who both still work here). They taught me how to set up and tear down the parlor and helped me improve my milking techniques. Steve taught me how to give an IV and how to recognize and treat all sorts of different fresh cow disorders. And when a cow died as I was treating her (probably not because of my treatment, but I felt horrible nonetheless), Steve reminded me that you can’t cure them all… “Gotta use your best judgment in the situation and go with it.” All along Steve has coached me as I learn to manage cows (and people)…he gives me new responsibilities, opportunities to try out my ideas, encouraging me to think for myself and be confident. And I know that he always has my back…he’ll let me make a mistake so that I can learn, but not a mistake that is detrimental to the herd. Bethann still chuckles at my early attempts at backing up a trailer. She must have let me try for half an hour one day to negotiate the trailer around some calf hutches. There has been progress in this area — she is now happy to ride in the passenger’s seat when we trailer heifers around the farm. On my first day on the farm as a summer student I was assigned to work with the crops crew. It must have been a rainy day when I started because Jake handed me a bottle of Windex and paper towels and asked me to clean the windows on the 7110 Case and then vacuum it out. He was apologetic — it wasn’t a very interesting job, but I was in my glory…I had never even been close to a tractor that was so big. That summer we were still using the V-rake. The merger came later on and Henry and I were the first ones to try it out in the field. It has been one of my favorite summer jobs since then.

Early on Ralph taught me how to use the coffee maker. I think there was a hidden agenda in that lesson… Want to make his day? Have the coffee freshly brewed when he finishes feeding close-up cows. “Thank ya’” he’ll say with a big smile! I actually didn’t drink coffee until I started milking cows at Miner. I remember it was wintertime and I was cold and tired, having started milking with Stephen at 4 a.m. With enough sugar in the cup, the coffee was tolerable and warmed me up while I finished milking. It didn’t take me long to transition from coffee once a week when I milked to coffee 7 days a week.

No class in college had prepared me for the hardest part of work at the dairy – labor management and teamwork. As a student I followed directions and learned about managing cows from those with whom I was working, observing discussions and disagreements between people who had different ideas of how things were to be done. But when I was the herdsman intern and then the full-time herdsman several years later, I became part of these discussions and became very aware of how and when to give direction, when to speak up, when to shut up and let it go. As one who does anything to avoid conflict, I have learned that conflict is unavoidable as you manage cows with a group of people. But I’ve come a long way in learning how to correctly work through (not avoid) our different ideas. And because we all have been learning how to better communicate, our team is stronger than ever and we are working together to manage a highly productive dairy herd while accommodating almost continuous research studies and numerous students.

When I’m working around the farm I can still hear in my mind certain phrases that helped me as a new herdsman. “When you’re delivering a calf, you’ve got to feel a head or a tail before you start pulling.” “When you’re driving through
FLEX FUEL DAIRY COWS CONSUME TOMATO SEEDS, IMPROVE SUSTAINABILITY

Flex fuel cars and trucks are gaining in popularity because they can easily and automatically adapt to many different types and blends of fuel. The dairy cow is nature’s fuel user, and she too can consume many different sources of feed while maintaining health and productivity. Perhaps most importantly, dairy cows can consume byproducts of other food industries, which have little to no nutritional value to the human, but are easily digested by the cow.

Byproduct feeds common in dairy cow diets include citrus pulp from orange juice processing, sugar beet pulp, almond hulls, cottonseed hulls, baked goods, and even coffee and cocoa bean hulls. California’s dairy cows consume 4 billion pounds of almond hulls every year that otherwise would be destined for the landfills. A byproduct that is fairly new to the dairy cow’s dinner plate is whole tomato seeds. The effects of dietary whole tomato seeds on dairy cow productivity were recently evaluated by University of California, Davis researchers and published in the Journal of Dairy Science.

During processing for tomato sauce and paste, between 3 and 30% of the tomato becomes a human inedible product. Whole tomato seeds make up 10% of the wet weight of the tomato and contribute around 60% of the total waste product. A novel method of tomato processing has been developed to retain a larger proportion of the pulp and the skin in the human edible fraction. However, this still results in the production of over 1 million tons of tomato seeds annually in California.

Byproduct feeds common in dairy cow diets include citrus pulp from orange juice processing, sugar beet pulp, almond hulls, cottonseed hulls, baked goods, and even coffee and cocoa bean hulls. California’s dairy cows consume 4 billion pounds of almond hulls every year that otherwise would be destined for the landfills. A byproduct that is fairly new to the dairy cow’s dinner plate is whole tomato seeds. The effects of dietary whole tomato seeds on dairy cow productivity were recently evaluated by University of California, Davis researchers and published in the Journal of Dairy Science.

The treatment diets were formulated to replace whole cotton seeds with whole tomato seeds while maintaining equal proportions of lipids in the diet. This resulted in four diets where tomato seeds contributed 4.0, 2.4, 1.1, and 0% of the diet on a dry matter basis.

Feeding whole tomato seeds did not affect dry matter intake, lipid intake, milk yield, or milk protein concentration or yield. As the proportion of whole tomato seeds increased in the diet, milk fat concentration decreased and milk fat yield tended to decrease, however milk fat concentration and yield were numerically higher at 1.1% compared with 0% whole tomato seeds in the diet. The alternate rumen biohydrogenation intermediates, C18:2 trans-10 cis-12 and C18:1 trans-10, which are associated with a decrease in milk fat synthesis, were not increased as a result of feeding whole tomato seeds. The normal rumen biohydrogenation intermediate C18:2 cis-9 trans-11 increased with increasing dietary whole tomato seed. This conjugated linoleic acid (CLA) isomer has been reported to be beneficial for human health.

Thanks in part to the dairy cow’s consumption of byproduct feed, on a per nutrient basis the dairy industry’s carbon footprint amounts to half of the carbon footprint contributed by the soy beverage industry. Byproduct feeding is an important part of our food system, because dairy cows convert products that are indigestible by humans into highly digestible, protein and nutrient rich milk. The jury is still out on the exact quality and quantity of byproduct feeds that can be included in the ration. However, it is safe to say that the conversion of byproducts into nutritious milk by flex fuel dairy cows is an important part of the global sustainability equation today and in the years to come.

— Melissa Woolpert
woolpert@whminer.com

HEAT STRESS, Continued from page 1

result of that – rumination would also be improved since it is positively related to feed intake and resting. We intend to conduct more research this summer to compare the longer-term impact of effective cow cooling in stalls to enhance the ordinary cooling over the feed bunk. Stay tuned to see what this year’s research tells us.

We know that cows become heat stressed at a THI of only 68 and experience reductions in resting, rumination, feed intake, and milk production. As the cow’s core body temperature rises she stands in an effort to speed cooling – and she’s not likely to lie down again until her temperature is lowered. Resting is the cow’s most valued behavior, and we must do an effective job of cow cooling to get her into the stall and lying down so that her resting requirement is met.

— Rick Grant
grant@whminer.com
LOW CRUDE PROTEIN DIETS FOR LACTATING DAIRY COWS

Crude protein (CP) is a required nutrient for dairy cattle, typically ranging from 15 to 18% on a dry matter basis. Dietary CP is often the most expensive macronutrient, and there’s been considerable interest in reducing the inclusion rate of high protein ingredients to decrease costs. In addition, there’s greater focus on reducing the environmental impact of the dairy industry, with much of the focus on improving nitrogen efficiency by reducing nitrogen excretion and ammonia emissions. Researchers at Cornell University reported that CP can likely be reduced by 0.5 to 1.5% without negatively impacting milk production while significantly improving income over feed costs and reducing ammonia emissions. Other recently published studies suggest that decreasing dietary CP by approximately 2% will reduce MUN or urinary nitrogen excretion without negatively affecting milk production. However, the diets must be balanced to meet metabolizable protein requirements, particularly the requirements of methionine and lysine in metabolizable protein. Methionine and lysine are co-limiting amino acids in lactating dairy cattle diets when corn and soy ingredients make up the bulk of dietary dry matter.

At Miner Institute we recently conducted a study evaluating the effects of a normal-CP diet containing 16.2% CP compared with a low-CP diet containing 13.7% CP. The diets consisted of 41% corn silage, 10% hay crop silage, and 49% concentrate. The diets also contained 32.2% NDF and 26.7% starch. Dietary CP percent was reduced by replacing canola meal, urea, and some soybean meal with soybean hulls. Both diets were balanced to meet metabolizable protein requirements. However, the normal-CP diet was slightly deficient in methionine as a percentage of metabolizable protein and the low-CP diet contained the rumen-protected methionine supplement Timet® (VETAGRO, Inc.) to elevate methionine in metabolizable protein. The ingredient changes decreased the cost of the low-CP diet by 40¢ per day.

Cows performed well on both treatments. Dry matter intake was not affected by the diets (Table 1). Milk yield was unaffected by dietary treatment, averaging 100.1 lb/day. Milk components were also unaffected by dietary treatment. Milk fat averaged 4.0% and 3.9 lb/day. Milk true protein averaged 3.24% and 3.2 lb/day. Milk urea nitrogen was decreased for cows consuming the low-CP diet (11.3 vs. 13.7 mg/dL). Furthermore, milk nitrogen efficiency, calculated as nitrogen in milk (lb) / nitrogen intake (lb), was increased for cows consuming the low-CP diet (39.6 vs. 32.6%). Milk urea nitrogen and milk nitrogen efficiency data suggest that cows consuming the low-CP diet wasted less protein while maintaining a high level of milk production. The minimum amount of dietary CP to achieve high milk production will not be the same for all farms. However, most farms should be able to decrease CP by 1 to 2% units when CP is replaced by fermentable carbohydrates such as high quality highly digestible forage or non-forage fiber sources. Low-CP diets can maintain high milk production and improve nitrogen efficiency and income over feed costs as long as the diets supply adequate amounts of methionine and lysine in metabolizable protein.

— Shane Fredin
fredin@whminer.com

<table>
<thead>
<tr>
<th>Item</th>
<th>Normal-CP</th>
<th>Low-CP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry matter intake, lb/day</td>
<td>59.3</td>
<td>59.3</td>
</tr>
<tr>
<td>Milk yield, lb/day</td>
<td>100.9</td>
<td>99.3</td>
</tr>
<tr>
<td>Fat %</td>
<td>3.91</td>
<td>4.03</td>
</tr>
<tr>
<td>Fat, lb/day</td>
<td>3.8</td>
<td>4.0</td>
</tr>
<tr>
<td>True protein %</td>
<td>3.22</td>
<td>3.25</td>
</tr>
<tr>
<td>True protein, lb/day</td>
<td>3.2</td>
<td>3.2</td>
</tr>
<tr>
<td>MUN, mg/dL</td>
<td>13.7</td>
<td>11.3</td>
</tr>
<tr>
<td>Milk nitrogen efficiency, %</td>
<td>32.6</td>
<td>39.6</td>
</tr>
</tbody>
</table>

Table 1. Milk production and nitrogen efficiency of cows fed normal- and low-CP diets.

Learn more about Miner Institute, visit www.whminer.org
TRACKING uNDFom INTAKE ACROSS STAGE OF LACTATION

We’ve focused much of our discussion regarding uNDF (undigested NDF) intake relative to high production cows. Whether it is uNDF30h or 240h, our concern has been asking, “How much uNDF can she eat and how much uNDF should she eat?” The first, relative to maximizing DMI for optimal production of milk and components. The second, in terms of maintaining sufficient gut fill and pNDF for a healthy rumen and healthy cow. But what about uNDF intake across stage of lactation and through the transition period? Given the energy dense/lower fiber diets of peak lactation compared to the lower energy/high fiber rations of late lactation and dry period, we thought that uNDF intake might be constant across stages of lactation. If not, should it be?

An initial look at the Miner Institute herd rations of far dry, close-up dry, fresh, high and late lactation cows provided some interesting data. We sampled these rations shortly after feed out on October 28, 2014. The herd was milking well with minimal health issues. As in no DAs, high production with high components. We analyzed the TMRs for NDFom (aNDFom for all the NDF analyses noted here) and uNDFom at 30 and 240 hours using the gold standard “Tilley-Terry” digestion method of individual flasks. Pen intakes were the best we could do for DMI to calculate NDF and uNDF intakes. The results are displayed in figures 1 and 2. Figure 1 shows NDF, uNDF30 and uNDF240 lbs. of intake. Of note is that NDF and uNDF240 seem to mirror each other, making me question the value of waiting ten days for information that isn’t that different from a simple NDF analysis. The greater variance of uNDF intake is seen at 30 hours, leading me to believe that this earlier time point may provide the greater insight into forage quality/NDF digestibility/uNDF affecting DMI and gut fill. Not to say that 30 is optimal but seemingly more appropriate than 240.

Figure 2 shows the same data relative to the close-up cow; close-up group set at 100% and all other values relative to that group. First, we see a gradual, smooth increase in NDF and uNDF intake across the stages of lactation. About 8 lbs of uNDF30 intake of the far and close-up dry cows, rising to 22 lbs at peak lactation. No sharp increases or decreases across pen rations. Notably there is little variation in intake of the uNDF240 across the rations, all around 5 lbs, but quite a difference in the uNDF30 intake.

Our current thinking is to look more closely at the fast pool of fiber degradation being the key to setting limits on DMI. Simply put, how long does it take a fiber particle to attain rumen passage size and density? Between particle reduction, upon ingestion and rumination, exposure of cell wall tissue for microbial attachment and digestion, it may be of greater value to determine the size and See uNDF, page 9
GROWING DEGREE DAYS &
FIRST CUT HARVEST TIMING

After a cold winter the 2015 growing season seemed to kickoff without much warning this year. Soils were slow to warm up with frost hanging around well into May in some spots. Once again this spring, many dairy farms in the northeast will be forced to straddle the corn planter and hay harvesting equipment. Kitty O’Neil with Cornell CCE reports that many cool season grass fields in the region are at or past peak quality. To add to the mix, winter was very difficult on alfalfa-grass stands in eastern northern NY due to a combination of factors, including infection of alfalfa by the brown root rot fungus. Adding another limiting factor to this mix is the lack of spring rainfall — ideal for planting corn while limiting yields in hay stands due to a lack of soil moisture.

The biggest factor influencing cool season grass and alfalfa development is the rate of heat accumulation (assuming soil moisture is adequate). The standard way to express the amount of heat accumulation for crops is by ‘growing degree-days’ (GDD), which is simply the difference between mean daily temperature and a baseline temperature that defines a lower range of plant metabolic activity. For alfalfa, the base temperature is 41°F. Since temperature has such a large impact on hay crop forage growth rates, going by the calendar to time first cutting of grass or alfalfa is not recommended.

Above is a graph showing the variation in alfalfa growing degree-day accumulations based on weather station data at Miner Institute from 2010-2015. Research suggests that alfalfa is near maximum quality (e.g., 40% NDF) when approximately 700 GDD have accumulated. Based on weather data collected at Miner over 2010-2014, the date at which at least 700 GDDs were reached varied from as early as May 4th to as late as June 5th. Using GDDs should not replace visiting alfalfa-grass fields to check on growth status, however GDDs are a useful index of relative growth stage of alfalfa and other field crops. Pure grass fields will always reach peak quality before alfalfa. Alfalfa stem length can also be used to estimate peak quality of pure grass and mixed stands, however this method is more time consuming due to intensive sampling in the field.

— Eric Young
young@whminer.com

EDUCATION, Continued from Page 3

mud and afraid you’re getting stuck, do not let up on the gas pedal…keep moving, don’t stop!” “Always listen to both sides of the cow with the stethoscope.” and when you are unsure about a situation, one of my favorite phrases from my co-workers, “Hard saying not knowing.” I am incredibly thankful to my co-workers who came alongside me as a student and helped me learn how to care for and manage dairy cows. They encouraged my enthusiasm for the industry, and I’m privileged to continue to work with this group of people.

This past March marked the 10th year that Steve Couture has been the farm manager at Miner Institute. Steve arrived in 2005 and steadily made improvements to the farm, turning it into a highly productive herd of cows averaging over 30,000 lbs of milk. He continues to lead the dairy with a vision for an ever more productive, healthy herd that can benefit the dairy industry by educating students in agriculture, producing useful and accurate research and demonstrating progressive and sound management techniques. He is always quick to pass on the credit to the dairy staff. Many times he says, “We have a great team….our herd wouldn’t be at this level today without them!” And this is true, but we also want to recognize the huge part that Steve has had as our farm manager for the past 10 years.

— Anna Pape
pape@whminer.com
Concern for environmental conservation has continued to increase over the past few decades, and the agricultural industry has become a prime target. With the introduction of the Food Security Act of 1985, Congress began allocating federal funding for conservation programs that continued to increase for thirty years. Although the Agricultural Act of 2014 is the first time that funding for these programs has been cut, the new farm bill has still allocated $56 billion to conservation programs and marks the first time that conservation funding has exceeded commodity subsidies. Many times a finger is easily and unfairly pointed at our industry as the source of many environmental issues. However, we play a critical role in adapting new environmentally-friendly management practices and the National Resources Conservation Service (NRCS) has many new and re-organized programs available to implement these changes through funding and technical assistance.

The Regional Conservation Partnership Program (RCPP) offers partnership agreements, program contracts, or easement agreements with the NRCS to promote conservation and restoration, particularly in the watershed areas. This regional program has recently combined the functions of the Agricultural Water Enhancement Program, the Great Lakes Basin Program, the Chesapeake Bay Watershed Program, and the Cooperative Conservation Partnership Initiative. Eligibility for participants includes landowners of agricultural or private forestland while partners include agricultural producer associations, farm cooperatives, non-profit conservation organizations as well as many other groups. Funding is allocated into three categories: critical conservation areas (35%), state (25%) and national (40%).

Another program available to producers is the Agricultural Conservation Easement Program (ACEP). Like the RCPP, this new program has combined the purposes of the Wetlands Reserve Program, the Farm and Ranch Lands Protection Program, and the Grassland Reserve Program. Split into two components, Wetland Reserve Easement and Agricultural Land Easement, the purpose includes wetland restoration, limitation of land for non-agricultural uses, and protecting grazing uses through cooperative agreements for land easement. Eligibility includes landowners of cropland, grassland, rangeland, or private forestland with NRCS funding from 50-100% of the restoration cost or easement value.

The Environmental Quality Incentives Program (EQIP) represents another program focused on land, water and air resource improvement as well as assisting producers to meet environmental regulations. Several national EQIP initiatives also available include the Air Quality Initiative, On-Farm Energy Initiative, Organic Initiative, and the Seasonal High Tunnel System for Crops. Although the Wildlife Habitat Incentive Program has been removed, a minimum 5% of funding is designated for wildlife habitat restoration and protection. Eligible applicants include agricultural or forest production landowners or persons involved with production on eligible lands with an adjusted gross yearly income of less than $900,000. These participants may qualify for up to $450,000 during the 2014-2018 period as well as receive the technical assistance to develop a conservation activity plan for up to 10 years. As an industry we need to be proactive with our conservation practices now rather than reactive to government regulations that will ultimately be issued in the near future. These programs are beneficial both in terms of technical assistance and support as well as cost-sharing the implementation of these plans. If interested in any of these programs and to see if you qualify for assistance, contact your local USDA/NRCS service center.

— Mac Campbell
campbell@whminer.com

The Heart's Delight Farm Heritage Exhibit at Miner Institute is now open! Visit weekdays 9 a.m. to 3 p.m. from May through October.

For more information, visit http://whminer.org/heritageexhibit.html
MOOVOING IN A POSITIVE DIRECTION

These last few weeks we have been busy at Miner Institute, training cows to eat from individual Calan bins in preparation for an upcoming nutrition study. The Calan Broadbent Feeding System is designed so that a cow can only eat from her individually assigned bin, so she must be trained to recognize it among a group of bins. I was involved in most of the training sessions, and it got me thinking about how we train and why it works.

Handfuls of hay/feed are held out in front of the bin to entice the cow to her bin. Once the cow is positioned in front of her bin, a Calan pendant around her neck allows her to unlock the door to her bin. Eventually the cow associates the behavior of standing in front of the specific bin and then lowering her head results in a feed reward. This concept of using positive reinforcement to encourage a behavior is an aspect of psychology known as operant conditioning. The term operant conditioning was coined by B.F. Skinner and it is defined as changing behavior by the use of reinforcement which is given after the desired response. Along with this strategy there are several other important aspects of being a successful trainer: slow movements, quiet voice, flexibility (both physically and in terms of schedule), and most importantly, PATIENCE.

It typically takes 3-4 training sessions before a cow is considered “trained”. A trained cow will independently go to her bin and enter to feed without any pushing or teasing. You shouldn’t get too discouraged if a cow isn’t fully trained after several sessions because hunger is a great motivator. Research shows that the longer a cow is deprived of feed, the more willing she is to walk to a food source. By no means does this mean we should starve cows until they cooperate, but it does prove that food can be a helpful motivator to encourage a behavior. After a cow is trained to her bin she can retain the location of her bin for very long periods of time— even across lactations— allowing for long term success.

You may be wondering why you should care about training cows to eat from a bin. Although you probably aren’t about to install a Calan Broadbent Feeding System in your barn, the concepts used during Calan training can be applied when acclimating cows to any novel environment, such as introducing first calf heifers to the milking parlor or moving cows through a chute. Cows are extremely routine-oriented, so putting forth effort to promote positive experiences in times of change will help establish a smooth regimen. Having patience, keeping quiet and calm, and even utilizing feed as a motivator can help make transitions into a new facility or routine easier and more efficient. It’s also important to realize that while these strategies work for most cows, there may be a few that simply won’t adapt. Try not to get discouraged by this; keep faith in the rest of the group.

— Alyssa Couse
couse@whminer.com

EVALUATING ALFALFA STANDS

Most North Country alfalfa made it through the winter in better shape than in many other parts of the U.S., probably due to the layer of snow that coated fields for most of the first three months of 2015. (Both average temperatures and average daily lows in NY State for this three-month period were at all-time lows, with records dating back to 1875.) Insects and diseases still can take their toll, however, and as you’ve been harvesting first cut you’ve probably been doing some stand evaluations. If your alfalfa didn’t look so hot during first cut it probably will look even worse during succeeding harvests as the soil dries out, further stressing damaged root systems. Normally it’s recommended that stands with fewer than 40 alfalfa stems per square foot be rotated out of alfalfa, but the presence of a forage grass can affect that decision. There’s still time to apply N to recently-harvested fields containing a sufficient amount of grass — I like this option with orchardgrass and tall fescue, not with timothy. Use ammonium sulfate or UAN + a urease inhibitor, not straight urea! (See page 10 for the related article on this.) Another option would be to plant corn following tillage or by killing the sod and using notill. Tillage is a less desirable alternative in stony fields simply because of the time required to pick stones prior to planting. I prefer corn to any other summer annual crop through mid-June. There are 80-day hybrids that at about 40,000 seeds/acre will yield fairly well even when planted well into June.

— E.T.

uNDF, Continued from Page 6

rate of digestion of the fast fiber pool to determine limits on gut fill.

We would be curious to hear back from you regarding lbs. of uNDF30 and 240 intake across lactation on your farm.

* Side note: NDF = generic term.
aNDF_{om} = amylase+sodium sulfite
NDF assay, ash corrected/organic matter basis.

When speaking of the “Miner Institute herd” this means non-research cows, fed normal farm rations.

— Kurt Cotanch
cotanch@whminer.com
RETHINKING NITROGEN SOURCES

It may be time to reconsider your decisions on nitrogen fertilizer sources, particularly urea. We’ve been assuming for many years that urea is OK for early-season broadcast applications when the soil is still cold, but recent research found high N volatilization losses even when urea was spread on frozen ground. Surface applications of urea during warm weather can result in losing one-third of the N unless at least half an inch of rain occurs soon after application. A light rain following urea application may actually increase ammonia N losses! Losses begin within hours of application, with most losses during the first two days. Adding a urease inhibitor (such as Agrotain) to the urea will greatly reduce these losses. Topdressing a 50-50 blend of urea and ammonium sulfate or UAN (which is a 50-50 solution of urea and ammonium nitrate) will also reduce N losses. That’s because very little N in the ammonium nitrate or ammonium sulfate will volatilize. However, using a urease inhibitor will significantly reduce ammonia losses from the urea portion of these blends.

If you apply urea to corn ground and disk it in you’ll avoid most volatilization losses but you may incur leaching losses, which is why we seldom recommend preplant N. It’s impossible to pencil out how much you’re likely to lose since leaching losses are weather-dependent. Urea is still a good product for sidedress N as long as it’s incorporated by immediate cultivation. If you apply UAN without cultivation or a urease inhibitor, a dribble-on application is preferable. Another reason I prefer UAN to urea for corn is that UAN provides nitrogen in both the nitrate and ammonium form, and research has shown some advantage to having N available from two sources. And while I have no supporting data, I think there’s enough advantage to more than make up the usual difference in cost per pound of N between urea and UAN.

— Ev Thomas
ethomas@oakpointny.com

HEAT DETECTION, Continued from Page 2

• Always keep track of device assignments and removals to ensure data and alerts are for the correct animal
• A paper copy should be kept in case assignments in the device software are incorrect.
• Keep track of herd events that may cause unusual behavior or activity changes such as vet checks or hoof trimming. Alerts for heat detection may arise on these days even if the animal wasn’t in heat but was more active than usual.

3. Make sure you understand how to interpret alerts and graphs.
• Each cow is monitored for differences from her normal behavior or measurements of production. Increases, decreases, or high variation from her normal can be seen in graphs.
• In Graph 1 (page 2), cow 1436 dropped approximately 30lbs in milk, a 52% increase in activity, and 57% drop in rest time. The lime green box at 78 days indicated she was bred on that specific DIM. She was seen standing to be mounted by another cow at 10am the same day and ovulated days later according to patterns in progesterone.
• In Graph 2 (page 2), cow 1537 on 4/30 had an increase in activity (blue line), increase in standing (peach line), decreased lying percent (green) and increase of lying bouts (magenta).
• In Graph 3 (page 2), cow 1537 with this leg based activity monitor, had a 59% increase in activity from her normal number of steps creating a heat alert and prediction of best time for insemination (green bar at the bottom of graph). The black dot on the green bar moves as time runs out for optimal insemination time.

The management and understanding of precision dairy technologies is critical when used for automated detection of estrus. Resources and support for precision dairy technologies are becoming more available as the market for them grows. The University of Kentucky dairy research team shares technology updates and findings on their Facebook pages: “University of Kentucky Dairy Science Program” and “Precision Patty”. Go like them today for more information on precision dairy technologies used for estrous detection!

— Lauren Mayo

* Lauren was a Summer Experience in Farm Management intern in 2013. Lauren is currently a graduate research assistant in Dairy Systems Management at the University of Kentucky.

* References available upon request.
SMART PHONES

The computing power of the smart phone clipped to your belt exceeds the total computing power required to put the first two astronauts on the moon. Impressive, though most of us don’t use our smart phones at anything approaching their capabilities. Computing power in general has increased tremendously: In 2007 the British government lost the records of 25 million of its citizens — their tax data, bank account details, addresses, and dates of birth. Did a warehouse burn down? A couple of semis turn up missing? No, what they lost was two CDs.

Katie Ballard and Wanda Emerich recently had great fun at my expense when I was at a meeting in Miami Beach on a speaking engagement, but sans computer and so I had to send several emails via smart phone. I hate to do this because my smart phone keyboard is small and I’m forever hitting the wrong keys. Somehow I managed to put my entire message to Wanda in the subject line of the email I sent her, and I sent another email to Katie instead of to the intended recipient. While I admit that I was dragged kicking and screaming into the Computer Age (“You can have my typewriter when you pry my cold, dead hands from the keyboard”) I now use a computer with a reasonable amount of skill (at least Word and PowerPoint). However, I still am nostalgic about White-Out and carbon paper, and with a typewriter I never had to reboot, download updates, use Ctrl-Alt-Delete — or get the dreaded “Blue Screen of Death”. I note without comment that the only time this happened was immediately after the first (and last) time Wanda borrowed my computer.

— E.T.

GREENHOUSE GASES AND THE THINKING FARMER

USDA Secretary Tom Vilsack wants farmers to do their part in combating global warming by reducing greenhouse gas emissions, including methane. Recent research in Holland suggests that one of the best ways to do this is to mow forages early — grass in the Dutch trials, but the results would probably be similar for alfalfa and other forage legumes. They found that enteric methane production in dairy cattle was reduced when grass (either fresh or ensiled) was harvested at a less mature stage. Cows fed well-fertilized, early-cut grass produced 30% less methane per pound of milk production. What sacrifice would U.S. farmers have to make to achieve comparable reductions in methane? None! That’s because the same practices that reduce methane production in dairy cattle are the very ones that agronomists have been recommending right along: Fertilized, early-cut grass makes more milk. Now we know that this also makes Bossy less gassy.

— E.T.

CRITTER NEWS FROM ABROAD

• The staff at the Sapporo Zoo in Japan spent several years trying to get two spotted hyenas to mate and reproduce, but they never exhibited any mating behavior (the hyenas, not the staff), and in fact often fought with each other. The zookeepers eventually learned the reason for their lack of success: Both hyenas were males! They explained their faux pas by stating that it’s difficult to visually determine the sex of hyenas. Anyway, that’s their story and they’re sticking to it.

• Last summer the Russian space agency launched a satellite that included one male and four female geckos in an attempt to determine if weightlessness had any effect on their sexual activity. Unfortunately when the satellite returned from orbit all the geckos were dead. However, the report stated that when found they all appeared to be smiling.

• Colleen, a young female panda at the China Giant Panda Breeding Research Base, was a virgin and would only play with her boyfriend — nothing more intense. Thinking that it may be due to ignorance rather than something more serious, the staff moved a TV into the panda cage and started showing films of pandas having sex. You may laugh at the idea of panda porn but Colleen soon got the idea and the rest, as they say, is history.
Closing Comment

Science gathers knowledge much faster than society gains wisdom.

www.whminer.org
518.846.7121 Office
518.846.8445 Fax