Animal Welfare: Stay Informed, Maintain Best Practices

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California’s passage of Proposition 2 has catalyzed reactions and discussions about possible referenda and policy-making in several states about animal welfare. Michigan dairy farmers must use approved practices and advancements in animal care and handling to maintain an outstanding reputation with the public.

California Proposition 2 has placed the food animal industries squarely in the political headlights. Numerous talks, advice, and strategizing have taken place since the second Tuesday of November, 2008. Passing with a 63% majority, Prop 2 sent a clear signal that change is coming and coming fast.

The focus of Prop 2 was clearly on veal calves raised for meat (plus sow gestation crates and caged hens). The California dairy industry appeared to be given a bye. But, a new legislative bill rapidly developed on banning a specific procedure --- tail docking, used in some dairies. The Illinois General Assembly has a bill similar to the California proposed ban on tail-docking on the docket. Dairy farms are clearly a focus.

Maine is the latest state to sign into law a bill containing nearly identical language to California Proposition 2. State by state the precedents are being set in a similar manner. Why? The language is simple, easy to understand and fundamentally hard to disagree with.

Key items of the statute are summarized as follows.

TREATMENT OF FARM ANIMALS. STATUTE. Requires that an enclosure or tether confining specified farm animals allow the animals for the majority of every day to fully extend their limbs or wings, lie down, stand up, and turn around. Specified animals include...
calves raised for veal, egg-laying hens, and pregnant pigs. Exceptions made for transportation, rodeos, fairs, 4-H programs, lawful slaughter, research and veterinary purposes. Provides misdemeanor penalties, including a fine not to exceed $1,000 and/or imprisonment in jail for up to 180 days. Summary of estimate by Legislative Analyst and Director of Finance of fiscal impact on state and local government: Probably minor local and state enforcement and prosecution costs, partly offset by increased fine revenue (http://voterguide.sos.ca.gov/past/2008/general/text-proposed-laws/text-of-proposed-laws.pdf).

What should livestock producers consider in light of these events? First, is there any truth to the reasons given for concern? If one cites science as a basis for decision making, are you in tune with the science? What do you understand about the ethical basis for the concern? Consider the example of tail docking of dairy cattle.

**Tail docking**

When the practice first gained some acceptance in the industry many reasons were given to tail dock, not only by producers but by scientists too, including lower milk somatic cell counts, cleaner cows, prevention of leptospirosis among workers handling the cows, and lower risks of microbial contamination. Unfortunately actual scientific evidence to support the claims was scant. Subsequently, research studies conducted in Australia, New Zealand, and in the U.S. at the University of Wisconsin, University of California-Davis, Purdue University and USDA-ARS Livestock Behavior Research Unit now indicate little or no correspondence to the often cited benefits on animal or human well-being and health. A comprehensive review of this scientific literature by the American Veterinary Medical Association (AVMA) led to a policy statement that does not support tail docking as a routine management practice (see tail docking in cattle backgrounder at www.avma.org/issues/animal_welfare/backgrounders.asp).

The AVMA opposes routine tail docking of cattle. Current scientific literature indicates that routine tail docking provides no benefit to the animal, and that tail docking can lead to distress during fly seasons. When medically necessary, amputation of tails must be performed by a licensed veterinarian. (www.avma.org/issues/policy/animal_welfare/tail_docking_cattle.asp)

Published, peer-reviewed scientific articles written by respected scientists have reached similar conclusions (articles available upon request to the author).

The message here is that when science cannot support a practice it may be best to abandon it or look for alternatives. Pick your battles carefully. The insistence to continue a practice when it is ill-supported scientifically and by the veterinary medical community casts doubt on the ethical bearings of an industry. Consequently, public confidence can be easily manipulated and eroded.

**What consumers think**

Recent consumer survey work (Tonsor, et al., 2009 in press) conducted by MSU indicates that consumers do place significant value on different attributes of animal welfare -- in particular on handling practices and housing conditions (www.msu.edu/~gtonsor/Presentations/Tonsor_2009MI_FarmBu-reauPPT(1.27.09).pdf).

The dairy industry (National Dairy Animal Well-Being Coalition) is implementing national animal care standards and has adopted a professional ethic with respect to the treatment and care of dairy cattle (www.dairywellbeing.org/guidelines.php). Use these principles or other well-constructed programs to form the basis of your philosophical approach to dairy farming. Whether your system is large or small, certified organic or not, pasture-based or confinement, the routine care and welfare of dairy cattle should always be a high priority.

"The AVMA opposes routine tail docking of cattle. Current scientific literature indicates that routine tail docking provides no benefit to the animal....”

**Communicate with the public**

Stay on top of advancements in animal care and handling. Be able to articulate best practices, why it’s a best practice and how the practice was evaluated. Most of all convey to your community that you care about the welfare of your animals. This is critical for the retention and fortification of public trust and helps to ensure a robust dairy industry in Michigan. The public depends on you to be the expert and to support the welfare of your animals.

References

KBS Studies Pasture-based, Robotic Milking System

Mat Haan
MSU Kellogg Biological Station

In the fall of 2008 the Michigan State University (MSU) Kellogg Biological Station (KBS) broke ground on the construction of a new free-stall dairy barn in preparation for the transition from a conventional dairy management system to a pasture-based dairy management system with automatic (robotic) milking. The transition to the pasture-based system and development of the Pasture Dairy Research and Education Center is funded with a grant from the W.K. Kellogg Foundation and additional support from Michigan State University Extension, the Michigan Agricultural Experiment Station, and the Michigan State University Provost Office and College of Agriculture and Natural Resources.

Converting to a pasture-based dairy system at KBS diversifies MSU’s research and outreach capabilities, allowing MSU to inform a small but growing number of pasture-based dairy producers in the state. The pasture-based dairy project also fits well with other projects at KBS, including the Long-Term Ecological Research and the Great Lakes Bioenergy Research Center projects, which support research and outreach in alternative agricultural practices.

The new free-stall barn is located in the middle of a 160-acre irrigated pasture and is equipped with two Lely Astronaut A3 Robotic Milking Systems. The large pasture and a smaller 32-acre pasture were seeded in the spring of 2008 to a 5-species pasture mix consisting of alfalfa, red clover, white clover, orchard grass, and tall fescue.

At capacity a 120-cow milking herd plus dry cows and heifers will be maintained at the farm. Both pastures are sub-divided for rotational grazing of cows and heifers during the grazing season. During the grazing season the majority of a cows’ feed intake comes from pasture with some concentrate fed during milking. When pasture is not available lactating cows are housed in the new barn and fed a ration of conserved forages (mainly hay, haylage, and grass silage) and concentrate during milking.

During the grazing season cows will be able to enter and exit the barn throughout the day to allow access to the robotic milkers and pasture. Robotic milking systems, or Automatic Milking Systems (AMS), allow cows to be milked on a voluntary basis anytime throughout the day. These systems have been used in Europe since the early 1990s. In recent years the technology has been adopted in Canada and into the US. The Kellogg Biological Station is the second dairy in Michigan to adopt robotic milking technology. The presence of AMS technology at the KBS dairy allows MSU researchers to evaluate this technology and demonstrate its use to Michigan dairy producers. Greater flexibility in the daily routine on the farm is...
often given as a major benefit of the technology. A dairy producer still needs to check the herd and ensure the AMS is functioning properly but he/she is no longer tied to a set milking schedule. This greater flexibility allows more time to be involved in other aspects of the farm operation or family and community activities.

An additional benefit of AMS technology is that the dairy producer has a large amount of information available on the quantity and quality of milk each cow produces at each milking, allowing the dairy manager to make informed decisions on the management of individual animals in the herd.

The new free-stall barn was designed and constructed to meet the standards of Leadership in Energy and Environmental Design (LEED) certification as defined by the U.S. Green Builders Council.

A LEED certified building must be designed and constructed in ways that decrease the environmental impact of the building during construction and over the life-time of the building and promotes the well-being of building occupants. Design and construction practices that conserve energy and water and promote the sustainable use of natural resources are central to the LEED certification process. The KBS dairy barn is the first agricultural building to seek this certification.

Research and outreach activities will focus on issues important to small- and mid-sized dairy operations but will also look beyond the farm to issues that are important to the consumer and society.

Dr. Janice Siegford, MSU Department of Animal Science, and her research group are conducting the first research at the new dairy facility this summer as they monitor the transition to the new system.

This summer, they are focusing on how the transition from a conventional dairy facility with three-time per day milking to a pasture-based dairy with voluntary milking will impact cow behavior, health, and performance and which animals adjust better to the new system.

Dr. Siegford plans to continue an active research program at the KBS dairy utilizing a series of video cameras that will allow her to monitor cow behavior and social interactions.

On August 19, 2009 KBS will host a Grand Opening at the new dairy facility. A dedication ceremony will begin at 9:30AM followed by a VIP tour of the new facility. From 1:00PM to 4:40PM the dairy will be open to the public for self-guided tours.

Visitors will have the opportunity to tour the new facility, learn about all aspects of the dairy including the robotic milking system and LEED certification, and visit with Michigan State University faculty, staff, and students about research, education, and outreach at the dairy.

The dairy is located at 10461 N 40th Street, Hickory Corners, MI. If you have questions regarding the Grand Opening or general questions about the dairy, contact Matt Haan, Pasture Dairy Research and Education Center Project Coordinator, at 269-671-2360 or by e-mail at haanm@msu.edu.

Rumensin® Toxicity in Heifers: A Case Study

John Anderson, West Michigan Veterinary Services
Dan Grooms, Dept. of Large Animal Clinical Sciences

Many dairy producers use Rumensin® (Elanco Animal Health) for dairy heifers as an aid to controlling coccidiosis and for improved feed efficiency. Rumensin® also is approved for use in lactating cows as a tool for improving milk production efficiency.

Monensin, the active compound in Rumensin®, has a very wide safety margin for humans and cattle. But, it can be toxic if not fed according to the Food Drug Administration-approved label. In other species, such as horses, monensin can be extremely toxic.

“The clinical signs of acute monensin toxicity are loss of appetite (24 to 36 hours post ingestion), diarrhea, dullness, stumbling... and death within three to 14 days.”
The Case
This case report describes a situation of acute monensin toxicity in a Michigan dairy farm. The problem occurred in the summer of 2008 in a group of 264 dairy replacement heifers between the ages of 6 and 14 months.

The heifers were housed in a single sloped three-sided barn on a bedded pack. They were fed a totally mixed ration (TMR) consisting of haylage (80%), corn silage (10%), straw (10%) and a mineral/vitamin supplement that was formulated to meet the specific needs of the heifers. Included in the mineral mix was Rumensin® added at a concentration formulated to provide 50 mg/head per day when mixed into the TMR.

The initial sign that something was wrong in this group of heifers was an acute drop in appetite. It was noted by the morning feeder that the heifers had not cleaned up their TMR from the previous day. Not suspecting any major problem, the employee feeding these heifers mixed and fed a new batch of TMR. Again the heifers had no appetite at all, even for the new feed. The feed was being mixed and delivered to the heifers by a relatively new and inexperienced employee who had been on the job for about 3 weeks.

Upon being informed of the lack of appetite, the herdsman investigated the feed and how it was mixed and discovered that concentrated Rumensin® 80 was being mixed into the TMR instead of a mineral premix containing the Rumensin®. The mineral premix was designed to deliver 50 mg/head per day of monensin when mixed into the TMR.

The Mix-up
The approved label dose of monensin for replacement heifers is 50 to 200 mg/head per day. The concentrated Rumensin® 80 was being added accidently to the TMR at the same rate as the mineral premix. By calculation, it was estimated that heifers were actually fed 20,000 mg/head per day, or about 400 times the formulated rate.

Rumensin® is available to provide different concentrations of monensin. Rumensin® 80 contains 80 grams of monensin and is designed to be added to TMRs. Rumensin® is often mixed into custom mineral mixes at various concentrations depending on how they are to be delivered (e.g., free choice or mixed into rations).

Diagnosis
Upon discovery of the mix-up, the ration was immediately removed from the feed bunk. Both alfalfa hay and green chop were offered, but the heifers were not interested in either of these feedstuffs. On the second day after exposure to the high concentration of monensin grassy hay was offered and some of the heifers began to eat.

Saturday morning (day 3 after exposure) a dead heifer was discovered in the group, but the others were starting to chew their cuds and looking brighter and more alert. On Sunday (day 4 after exposure) two more dead heifers were discovered. It was noted that some of the remaining heifers appeared more lethargic, but most were chewing their cuds.

On Monday morning (day 5 after exposure) there were 11 dead heifers. At this point, the herdsman called the herd veterinarian. Based on the history, it was suspected that acute monensin toxicity was the most likely cause of the heifer deaths.

Necropsies were conducted and based on recommendations from the Michigan State University Diagnostic Center for Population and Animal Health (DCPAH) and Elanco Animal Health, samples were collected and submitted for diagnostic analysis. Upon diagnosis, the primary lesion observed was a "gritty" feel when the heart muscle was cut.

Upon further investigation of this case, it was discovered that the feed supplier had mistakenly delivered a pallet of Rumensin® 80 instead of the mineral premix containing Rumensin® at a much lower concentration. The inexperienced feeder did not recognize the mix-up and incorporated the concentrated Rumensin® 80 into the TMR at the rate the mineral mix was to be incorporated.
Signs of toxicity

One week after the initial exposure, 35 of 264 heifers had died. Other heifers appeared to be suffering from heart damage as evidenced by brisket edema, bottle jaw (swelling under the jaw), lethargy, and exercise intolerance.

Most of these heifers failed to thrive and were eventually culled. Some heifers were not clinically affected and appear normal today. It is assumed that the spectrum of effects observed was related to how much of the TMR and monensin individual heifers ingested.

The LD50 (lethal dose in which 50% of exposed cattle die) of monensin consumption is estimated to be between 10 to 40 mg/lb (20 to 80 mg/kg) of body weight.

Monensin causes cell death by disturbing intra-cellular ion homeostasis and destabilizing cell membranes. Cell damage is most evident in heart and skeletal muscle.

Lesions most commonly seen with monensin toxicity in cattle are heart and skeletal muscle degeneration, necrosis and mineralization. Secondary lesions and clinical signs occur from acute heart failure or chronic cardiovascular insufficiency. There is no specific treatment or antidote for monensin toxicity.

Summary

This case illustrates several important points:
1) Some feed ingredients, if given incorrectly, can be toxic to cattle. Feed ingredients need to be monitored carefully and cautions taken to prevent toxic situations.
2) It is important to monitor feed ingredients when they are delivered, making sure that they are actually what was ordered.
3) Development and implementation of standard operating protocols can reduce the risk of mistakes occurring.
4) Employee training is essential. Assuming that employees know the differences in different feed ingredients can lead to disaster.

References


Climate Change: Are Cows the Cause or the Cure?

Ben Bartlett
MSU Extension Educator, Upper Peninsula

With today’s milk prices, most dairy farmers are not worried about climate change or carbon emissions from dairy cows. However, the general economy will turn around, milk prices will improve, and environmental issues like climate change will again become more important. One way this issue has been addressed is to talk about how cows are more efficient today and therefore we need fewer cows. But, I think this is the wrong way to confront these environmental concerns.

If we say that keeping fewer cows makes for lesser negative environmental impact, we are admitting that cows are bad for the environment. I don’t think cows or their gas emissions are bad for the environment. Let’s try to sort out why it’s not the cows but sometimes the way we manage cows that can be less than environmentally friendly.

Let’s clarify two important issues: 1) we know the world is currently adding more carbon to the atmosphere than we are taking out; and, 2) many people believe the extra atmospheric carbon will increase average ambient temperatures. We can measure and calculate where the carbon of the world is located but the effects of relocating carbon from storage to the atmosphere can only be estimated.

It is currently fashionable to point the finger at cows because they release carbon (the term I will use for greenhouse gases) when they belch and do what cows do when they eat over 50 lb of feed dry matter every day. However, taking cows to task for releasing carbon into the atmosphere is only looking at part of the equation. Allow me to use an analogy.

There is nothing wrong with spending money if you make enough money to replenish the bank account. It’s okay to spend $2 if we work and put $2 back in the bank, or we could spend $2,000, as long as we put at least $2,000 back in the account. The very important point is that spending money or actually releasing carbon into the air is not bad if the rest of the system keeps the account in balance.

We have a cycle, we store, we spend, we store, we spend, and the really important point is that we keep the account or cycle in balance. For a cow to belch carbon into the air is no more harmful to the atmospheric levels of carbon than it is for you to spend money for dinner as long as you can afford it. Likewise, the whole cattle production system (the farming system) re-captures that carbon.

If we look back when bison, estimated to be over 50 million, ran wild in massive numbers across the prairie, they released tremendous amounts of carbon into the air. But at the same time, the bison were eating the prairie grasses, which had collected huge amounts of carbon dioxide from the air. Then through their manure and uneaten grasses they replenished the soil with fertilizer nutrients and organic matter.

Not only was the carbon cycle probably in balance, the carbon bank account was increased and the fertile prairie soils with their high organic matter levels (high carbon levels) made up for other carbon releases such as prairie grass fire caused by nature.

This was short term storage of carbon. We also need to recognize that carbon has a long term storage system, coal and oil as two examples of legacy carbon.

In a way, it’s sort of like your checking account and your savings account. If you can spend more than you have in your checking account you tap into your savings, but over time, you must pay back your savings account or you will run out of money. In cattle production, if cows were just raised on prairie grass, there would be no argument that cows are NOT adding carbon to the atmosphere. But cattle today are not just raised on prairie grass and that is the rest of this story.

Cows today are fed forages and grains and how those feedstuffs are raised and how the cow manure gets back to the land is the important part of the cycle that is being ignored, or not given adequate attention in some cases. On many of our farms, the crops are raised with minimum or no tillage and that’s a plus because it increases and preserves the organic matter.

We use crop rotations and perennial forage crops as part of the feed production plan. And of course, Michigan farmers today with the high cost of fertilizers are especially careful about re-cycling the nutrients from manure back to their cropping systems.

Continued on page 22
The MDR editorial team is devoting the next few issues to a series of “tips.” This follows from the all-encompassing lead article from the April edition titled “Weathering the Storm.” It is our hope that expanding upon the different aspects of dairy management will benefit the industry especially at the current harsh economic climate.

Management Tips

Be Careful What You Cut

Dean Ross
MSU Extension Dairy Educator
Southeast Michigan

As the vice of low milk prices puts the squeeze on the dairy industry across the U.S., everyone is searching for ways to be less unprofitable.

Even in good years, farm managers want to reduce excess cost and now in a really bad year there often isn’t very much left to cut. The risk a business owner runs in this situation is cutting cost so deeply that that the farm’s ability to produce is hobbled.

The current challenge is how to maintain or increase production while holding costs down. Following the obvious scrutiny of labor and feed costs, that are often a target for the chopping block, cutting various technical services used by modern dairy operations is also considered to reduce operations. These may include things like DHIA testing or the use of services for breeding or sire selection, even manure hauling or crop management services.

But you should think twice before canceling these management tools outright. They were originally brought in to supplement or support the farm operations and they still may have significant value to the bottom line if they are being used effectively. Try this short three-step test to determine their value to management before you drop them.

1. Why did you “hire” this service in the first place?
   Was the service brought in to replace time spent by the manager or to replace labor on the farm? If so, was this a cost-effective way to accomplish that management task or skill? And, if this service is dropped is there anyone on the farm with the time, expertise, and motivation to fill the void? An example of this would be a hiring out pesticide spraying. Perhaps the reason you originally contracted to have this done was because you did not want to be encumbered with maintaining a pesticide license or have to store chemicals on the farm.

2. If this service were canceled, what would be the impact to the farm? What would be the impact on the cows?
   Would the farm lose an important skill set that will impact the profitability of the farm? For example, will breeding the cows yourself instead of using a breeding service mean more days open and more services per conception and longer average days in milk? These things may have direct negative impacts on productivity and profit.

3. Does this service provide you with an economic “edge” that can be exploited to enhance positive revenue generation and even profitability?
   With a service like DHIA records, are you using them to their best advantage on your farm? For example, if you are using a hoof trimmer, are you collecting the data they can generate on lesions and treatments and using it as a management tool to reduce lameness? Reducing lameness, in turn should be generating more revenue for the farm. Be sure you are fully exploiting the benefits of a service before you drop it.

In the recent past the business of dairy farming has become a much more complicated and sophisticated management process. The use of specialized contractors and new technologies have helped shape the face of the modern dairy industry. It may well be difficult to remain in a position of profitability in the future without them.

ACRE Payment Eligibility

Dennis Stein, Roger Betz and Van Varner
MSU Extension Farm Management Educators

Don’t overlook the provisions of the new Farm Bill like the Average Crop Revenue Election (ACRE) program and how it could be part of your farms risk management strategies.

One of the aspects of the new ACRE program is the need to collect historical farm-level yield information. As of this time, we still have some questions on what it will take...
to prove your farm’s historical farm yields.

Expectations are that methods similar to the past will be used. Ninety-five percent of the county average yield can be used.

The size of ACRE payments is largely determined by a state revenue index based on national price and state yield levels; a farm-level revenue is also established to determine whether a producer is eligible for an ACRE payment. Average Crop Revenue Election uses a revenue index based on national prices and state yields and the individual farm yields must also fall below the farm’s benchmark revenue.

A farm’s benchmark revenue is based on the moving 2-year average of national prices and a moving 5-year Olympic average of farm yields. With this program, the producers will also include what they paid for crop insurance premiums in the calculation of their farm-level revenue benchmark. (This makes triggering at the farm level easier; and is an encouragement to buy crop insurance.)

The deadline for ACRE program elections for the 2009 crop year was extended from June 1st to August 14th to allow more time for farms to consider this important decision. You will not be able to wait until the last minute to begin enrollment. A farm operator needs to start the process now and then can make the final decision for 2009 enrollment by August 14th.

By August we will have good information about expected state revenue and individual farms yields which will allow an informed decision for the 2009 year. There are many factors to consider, such as, how closely your individual farm yields follow those at the state level when making your ACRE program decision.

It is important to understand that ACRE is not a substitute for crop insurance but a supplement to your farm’s risk management plan.

Your local Farm Service Agency has information. Also contact your local MSU Extension Educator for additional information and planning tools related to this program. Additional information, including handouts and video information clips (webinars) can be found at: www.msu.edu/user/betz/

SURE: The new name for disaster aid for farms

Supplemental Revenue Assistance Payments (SURE) is the disaster relief program that is now written into the new Farm Bill to help farm producers recover from major negative farm revenue events. Be certain that you understand your farm’s eligibility requirements for this program.

One major change from prior disaster programs is that farms are now required to have some level of farm revenue insurance on all crops that represent over 5% of expected revenue. The crop insurance could be as simple as CAT or NAP coverage or your farm may have purchased one of the many revenue programs available. One point that many farms overlooked in 2009 is that crops, like hay, fruit crops and wheat, have crop insurance deadlines for enrollment in September each year, so to be eligible for 2010, you need to have crop insurance in place this fall.

Supplemental Revenue Assistance Payments are designed to be made to eligible producers on farms in disaster counties (or contiguous) that incurred as little as 10% crop production or crop-quality losses or both during the crop year. These payments are intended to replace the old system that required congressional action to allocate funds to cover disaster program payments. Now we have a formula in place to provide disaster assistance for your farm, but you need to take action to guarantee your farm is eligible. It is important that you understand SURE and the implications for your farms.

Your local Farm Service Agency has information and you can contact your local MSU Extension Educator for additional information and planning tools related to this program. Additional information, including handouts and video information clips (webinars) can be found at: www.msu.edu/user/betz/

“Supplemental Revenue Assistance Payments are designed to be made to eligible producers on farms in disaster counties (or contiguous) that incurred as little as 10% crop production or crop-quality losses or both during the crop year...”
Looking Towards 2009 Corn Silage Harvest

Herb Bucholtz and Mike Allen
Dept. of Animal Science

July, 2009: it’s time to review harvesting tips to maximize the feeding value and yield of your corn silage crop!

1. Harvest at 40% whole plant dry matter (WPDM)
This is the most important information to know for making good corn silage. Bacteria present on the corn plants in the field ferment plant sugars contained primarily in the stalk to produce fermentation acids that preserve the corn silage.

To ensure a vigorous and successful bacterial fermentation the dry matter (DM) content of the whole corn plant material at harvest is very important. The proper DM content for optimum fermentation is between 30% and 40%. If corn silage is wetter than 70% moisture (30% DM) excessive fermentation acids can reduce palatability and feed intake. Wetter silage is more likely to result in effluent loss, which is a huge potential environmental concern for Michigan dairy farms.

If corn silage is drier than 40% DM there might not be enough sugars available for adequate fermentation increasing DM losses and resulting in heating at feed-out. In addition, if corn silage is too dry, kernels become hard and starch digestibility is reduced.

Determining the whole plan DM at the beginning and during harvest is the most critical and important harvest management practice to implement. Dry matter content can be determined using a Koster™ moisture tester or microwave oven. A publication for using a microwave for moisture testing can be obtained at: http://ianrpubs.unl.edu/range/g1168.htm

Kernel milk line has been used in the past as an indicator of when to harvest corn for silage. Kernel milk line is an indicator of kernel maturity but is not a good indicator of whole plant DM.

2. Harvest at chop height of 4 to 6 inches
Some publications suggest chopping at 12 to 16 inches from the ground, which will increase the grain concentration and reduce the concentration of fodder in the silage. Implementing this 12 to 16 inch concept would increase the energy density but decrease the fiber content of the silage.

While this practice might make sense when the price of corn grain greatly exceeds the cost of growing and feeding corn silage, many producers are concerned that dairy cow diets do not contain sufficient fiber and they purchase dry hay or straw to increase dietary fiber.

This doesn’t make sense because corn plant fodder is a good source of fiber and leaving 12 to 16 inch stalks and leaves containing potentially digestible fiber in the field while purchasing other perhaps less digestible fiber sources is a costly venture. MSU’s recommendation is to harvest corn at 4 to 6 inches for silage.

3. Chop length-theoretical length of cut (TLC) of ¼ to ½ inch
Kernels and cobs need to be broken. To accomplish this, chop length may need to vary between ¼ and ½ inch TLC for choppers without a processor depending on WPDM. A chop length of ¼ inch should be used only for very dry corn plants to ensure that the kernels are nicked. Short chop to length silage will require inclusion of another forage source in the ration for adequate effective fiber. For choppers with a processor a ¼ inch TLC is recommended when WPDM is 30 to 40%. Processing when WPDM is less than 30% may result in mashing of the kernels and stalk and the processor rollers should be backed-off to prevent mashing.

4. Filling and packing
To prevent spoilage between filling layers, fill bunkers as rapidly and continuously as possible. Stopping for a day or more may result in spoilage layers that can depress feed intake. Pack bunkers continuously during filling to expel air that is trapped between plant particles.

5. Covering
Cover bunkers and tower silos as soon as filling is completed. Plastic covering will prevent exposure of the top silage surface to air and water and control the extent of spoilage in the top layers. Tucking the plastic around bunker sidewalls will prevent water from seeping into the silage which will help prevent sidewall spoilage.

6. Preventing potential leachate problems
Harvesting at 30 to 40% WPDM is the first step in preventing silage seepage. Harvesting at less than 30% WPDM for horizontal silos increases the potential for seepage.

Vertical silos require higher WPDM to prevent leaching. After filling and covering is completed take care to clean up plant material from around the bunker, bags, piles or tower silo. Implement a plan to direct water from the silage bunk area to a properly designed system to prevent possible environmental problems.
Why “Buy” Disease When You Can “Borrow” It?

Ben Bartlett, Extension Dairy Educator, Upper Peninsula
Dan Grooms, Dept. of Large Animal Clinical Sciences

Sounds silly, nobody wants to add a new disease to their herd but sometimes the obvious need for basic biosecurity gets completely left out of the picture. For example, someone recently posted the query of what was a fair price for “renting” a bull.

The only better way to spread disease than a bull moving from farm to farm would be to bring sale barn cattle home to mix with your cow herd on a regular basis. You could say the cost of “renting” a bull is “priceless” if biosecurity is not considered.

It is an unfortunate fact that if you have an established herd, most new disease problems in your farm will be disease issues that you bought and paid for. The animal then walked into your barn without proper biosecurity procedures.

This is supported by numerous research studies that show that the biggest risk factors for devastating diseases entering a farm are bringing in new animals, whether purchased or borrowed!!

This includes diseases such as Johne’s disease, BVD, hairy heel warts, Salmonella, Lepto, Mycoplasma, Staph and Strep mastitis.... shall we go on? It is possible that a visitor or birds or even the milk truck moved the problem to your farm, but in reality, most disease problems walk in on four legs, ones that you paid for.

What’s the solution since not every herd can be completely isolated and sometimes animals needed to be added to the herd or returned after being shown at the fair? The solution is not reading about, talking about, or studying but actually having in place and PRACTICING basic biosecurity.

Good biosecurity is not a guarantee but can greatly decrease the chance of spending significant time and money and experiencing huge amounts of lost income to new disease issues...”

It is not important to have perfect biosecurity but it is critical to have basic biosecurity.

Biosecurity is four simple steps:
1. Test - Disease Screening - Staph mastitis, BVD-PI, Johne’s.
2. Isolate - 30 feet for 30 days - A great rule of thumb is feed and handle new animals last.
3. Sanitation - Clean and Disinfect - before coming onto farm or when moving between older and younger groups of animals.
4. Immunity - Build Immunity - If sanitation is the fence, then vaccination is the guard dog.

Test, Isolate, Sanitation, and Immunity (TISI): The most important part of biosecurity is putting TISI into practice, every day and every time an animal comes on to your farm, no exceptions.

The person who was thinking of renting a bull was trying to cut costs but without taking biosecurity into consideration, putting his whole herd and livelihood at risk. Times are tough, but don’t make it worse by cutting corners.

If you would like to learn more about biosecurity practice in U.S. dairy farms, visit the National Animal Health Monitoring web site at http://nahms.aphis.usda.gov/dairy/dairy02/Dairy02An_dis_rept.pdf
Adam Lock joins the Department of Animal Science as an assistant professor with a distinguished pedigree: he grew up on his family’s dairy farm in the United Kingdom. Added to his academic training and experience, Lock has developed vast knowledge in dairy production along with ruminant nutrition and physiology.

Says Karen Plaut, professor and chair of the Department of Animal Science, “I am excited to have Adam Lock joining our dairy nutrition faculty. He adds breadth to our program as he is focusing on the effects of bioactive fatty acids. This is an area that continues to grow with new ideas emerging on the role of these compounds on both the dairy cow and in human health.”

Plaut adds that Adam is able to explain to dairy farmers the role of fatty acids in the rumen and in the cows’ diet and how they impact milk production and composition. “Adam has the ability to talk to dieticians and other public health professionals about the role of dairy products in the diet.”

Lock’s specific focus is on dairy cow nutrition, formation of bioactive fatty acids in the rumen and their impact on animal production and human health. He has expertise in bioactive fatty acids; dairy cow nutrition; fatty acid digestion and metabolism; biohydrogenation; milk fat synthesis; human health; conjugated linoleic acids; trans fatty acids; breast cancer; atherosclerosis; inflammation, and lipoprotein metabolism.

“Michigan State University has a strong tradition of quality in agricultural research and extension and I am excited by the prospects and opportunities this position offers, which will enable me to be an integral part in shaping the future of the industry, through both research and technology transfer and in the teaching and development of the dairy producers and scientific leaders of the future,” he says.

Lock’s research relating to human nutrition and health has focused on the role of milk fat-derived bioactive fatty acids on human health, in particular trans fatty acids including conjugated linoleic acid (CLA) isomers.

“This represents a hot topic in human nutrition,” he says, “and my collaborators and I have recently been successful in securing USDA-NRI and Dairy Management Inc. funding in this area, investigating the impact of in utero exposure to trans fatty acids on atherosclerosis risk in later life and the role of fetal uptake of CLA isomers on subsequent mammary gland development.”

He also thinks that his research efforts in trans fatty acids is highly relevant and timely given the fact that a high proportion of the current U.S. human population would have been exposed to sources of human fatty acids during their lifetime. He remarks that “results from this research may ultimately have significant implications for global public health and importantly will have immediate application by providing essential knowledge for use by government, nutritionists and health professionals in the development of policies and recommendations regarding the health implications of trans fatty acids.”

Lock relocates from University of Vermont where he has done research and taught since 2006. His professional experience started in 1995 with the Voluntary Service Overseas (VSO), Department of Animal Production, Sokoine University of Agriculture, Morogoro, Tanzania. In 1997 he enrolled in a graduate program

Continued on Page 21
Santiago Utsumi has joined the Department of Animal Science as an Assistant Professor. A grazing ecologist, he is stationed at the Kellogg Biological Station.

Utsumi’s areas of interest are in animal-plant interactions, grazing behavior of livestock, mechanisms of diet selection and forage intake, grazing systems and ruminant nutrition.

“My major goal for the upcoming years at KBS/MSU is to develop an integrative research, extension, and education program in grazing ecology and management specifically tailored to pasture-based dairy systems in Michigan,” Utsumi says.

Utsumi plans to use experimental and modeling approaches to address research questions at the animal, pasture, and whole farm system levels. He adds, “Outcomes from research efforts will be used to support the development of novel cost-effective and environmentally-sound grazing and farm management strategies directed at a more efficient use of natural resources and animal performance.”

Dr. Karen Plaut, Chair of the Department of Animal Science says, “We are excited about Santiago joining MSU as he brings to us an additional perspective on the relationships between plants and animals in grazing systems and expands the type of research MSU can do to help Michigan dairy farmers.”

Originally from Argentina, Utsumi received his doctoral degree from New Mexico State University in 2008 with the distinctive “Outstanding PhD Graduate” award. In addition, he has a specialization in plant and soil management from the College of Agriculture, University of Mar del Plata, Argentina.

His work experience includes having been a research assistant at INTA-UNMdP, Argentina from 2000 to 2004; a research assistant at the Department of Animal and Range Science, New Mexico State University, from 2005 to 2008; and as a postdoctoral research specialist at the same department until he moved to MSU in June.

He has also garnered extensive consulting and extension experience particularly from Argentina. This includes being a reviewer for the Argentine association of Animal Production and Range Ecology and Management Journals.

Utsumi has taught quantitative genetics at the Faculty of Agriculture, Universidad Católica Argentina and also at the Faculty of Veterinary, Universidad del Salvador, Argentina, from 1996 to 1999.

He has received many awards and scholarships including a research distinction award from the Argentine Association of Animal Production in 2002; the Noble T. Jones Scholarship, College of Agriculture and Home Economics, NMSU, 2006-2007; the Merit-Based Enhancement Fellowship Grant, Graduate School, NMSU 2006-2007; and the Joe D. Wallace Endowed Graduate Scholarship, Department of Animal and Range Sciences, College of Agriculture and Home Economics, NMSU, 2007-2008.

Fluent in English and Spanish, Utsumi has to his credit numerous academic publications in the form of journal articles, reviews, technical notes and abstracts. He is affiliated with professional organizations such as the Argentine Association of Animal Production and the Society for Range Management.

As he assumes his new position, part of Utsumi’s priorities are as he says, “to establish strong interactions with students, farmers, managers, and different components of the dairy industry in Michigan.”
MSU Earns Honors at National Dairy Challenge

Elizabeth Karcher
Miriam Weber Nielsen
Dept. of Animal Science

The eighth annual North American Intercollegiate Dairy Challenge (NAIDC) was held in Syracuse, NY on March 27-28, 2009. The contest presented Michigan State University undergraduates the opportunity to evaluate dairy farm management. As a result of their perseverance and dedication, MSU students achieved a gold placing at this event.

Members of the team representing MSU were animal science seniors Nicole Beeching, Lawrence; Lindsey First, Ionia; Jessica Fry, Blanchard; and agribusiness management senior Brad Curtis, Williamston.

The team was coached by animal science professors Herb Bucholtz and Miriam Weber Nielsen, dairy academic specialist Elizabeth Karcher, animal science doctoral student Marcus Hollmann, and agricultural economics doctoral student Nicole Olynk. Cornell University hosted this year’s competition, which attracted 31 universities from across the United States and Canada.

The Big Ten conference excelled this year receiving all four of the first-place platinum awards. These prestigious awards were given to University of Wisconsin-Madison, Purdue University, University of Minnesota, and The Ohio State University. Each member of the platinum teams received a plaque and $200 scholarship.

The competition offers an environment that tests the students’ knowledge of the dairy industry in a fun and educational setting. One of the most important aspects of the Challenge is enhancing students’ ability to work as members of a team.

On day two, teams present their recommendations to a panel of judges. Students must field questions from each of the judges.

Equally important in the learning process is the oral feedback provided by the panel of judges. The evening concludes with a banquet and presentation of awards.

Michigan Dairy Challenge

The MSU Dairy Challenge is held in the fall and all undergraduate students with an interest in dairy are encouraged to participate. The event is designed to be similar to the national contest. From participants in the MSU Dairy Challenge, two 4-person teams are selected. One team competes in the Midwest Regional Dairy Challenge and the other team competes in the NAIDC.

Day one of the two-day competition begins with each team receiving a packet of information on the dairy they will visit that day. Each packet includes production and farm management data. After a visit to the dairy and an interview with farm personnel, team members work together to develop a comprehensive program that includes recommendations for herd management. Students are challenged to not only identify potential areas of improvement, but also to prioritize these areas.

North American Intercollegiate Dairy Challenge: (left to right) Brad Curtis, Nicole Beeching, Jessica Fry, and Lindsey First at the National Dairy Challenge in Syracuse, NY.
Fifty-six undergraduate students participated in the MSU Dairy Challenge last fall. The advanced division consisted of seven teams and the novice division had eight teams.

Students in the advanced division must have completed courses in dairy nutrition or advanced dairy management. The contest farm was owned by Dennis and Doris Tuber of Ionia.

Members of the winning team in the advanced division received $150 each and consisted of Brad Curtis, Nikki Edgecombe (veterinary technology junior, Jenison), Greta Koebel (agribusiness management senior, Three Oaks), and Joao Paulo Martins (animal science master’s student, Brazil).

Members of the second-place team received $75 each and consisted of Lindsey First, Jessica Fry, Charlie Kunisch (animal science sophomore, Jeddo), and Jackie Rowley (animal science junior, Richmond).

Members of the team placing third and receiving $25 each were Jody Bugaiski (animal science senior, North Street), Gail Carpenter (animal science junior, Dansville), Natasha Lower (animal science junior, Battle Creek), and Lyndsay Stakenas (animal science junior, Free Soil).

Members of the winning team in the novice division received $25 each and consisted of Michelle Dawes (animal science sophomore, Saranac), Joe Pasch, (animal science junior, Weidman), Brice Stine (crop and soil sciences junior, Ubly), and Erica Wines (animal science junior, Richland).

“...The winning team in the advanced division of the MSU contest received $150 each and consisted of Brad Curtis, Nikki Edgecombe (veterinary technology junior, Jenison), Greta Koebel (agribusiness management senior, Three Oaks), and Joao Paulo Martins (animal science master’s student, Brazil...”

Members of the second-place team received $25 each and consisted of Michelle Dawes (animal science sophomore, Saranac), Joe Pasch, (animal science junior, Weidman), Brice Stine (crop and soil sciences junior, Ubly), and Erica Wines (animal science junior, Richland).

Members of the second-place team received $25 each and comprised of Jillian Holdwick (animal science sophomore, Harbor Beach), Rosemary Rice (animal science sophomore, Fillion), James Weber (dairy management freshman, Vassar), and Eric Westendorp (dairy management freshman, Lansing).

Members of the second-place team received $25 each and comprised of Jillian Holdwick (animal science sophomore, Harbor Beach), Rosemary Rice (animal science sophomore, Fillion), James Weber (dairy management freshman, Vassar), and Eric Westendorp (dairy management freshman, Nashville).

Four students represented MSU at the fifth annual Midwest Regional Dairy Challenge. The event was held January 29-31, 2009 in Rochester, MN and included 69 students from 15 universities and colleges. The design of the Midwest Regional is unique in that students are placed on 5-person teams with students from other colleges and universities. Participants from MSU included Joe Pasch, Jackie Rowley, Kayla Stomack (animal science senior, Minden City), and Jaimie Strickland (animal science senior, Lansing).

Financial support for the MSU Dairy Challenge was graciously provided by Cargill Animal Nutrition, Vita Plus, and the Frederick P. Halbert Dairy Memorial Endowed Scholarship Fund. Thank you to the Tubergen Dairy Farm and Matt Wood and Ken Casebere, Vita Plus, for working with the Tubergens to host the MSU Dairy Challenge.

The time and effort by the MSU Dairy Challenge judges is greatly appreciated: Julie Ainsworth, NorthStar Cooperative Inc.; Dr. Herb Bucholtz, MSU Animal Science; Dr. Tony Ellis, Countyline Veterinary Clinic; Dr. Chuck Jamison, Cargill Animal Nutrition; Dr. Richard Pursley, MSU Animal Science; Phil Taylor, MSU Extension Dairy Educator; Dr. Jon Townsend, Land O’ Lakes/Purina Feed; and, Matt Wood, Vita Plus.

Special thanks go to Marcus Hollmann, Lindsey DeVries, Olivia Genther, MSU Animal Science; Dean Ross, MSU Extension Dairy Educator; and Doug Brook, NorthStar Cooperative for help in coordinating the MSU Dairy Challenge.

The support from all of the Dairy Challenge sponsors makes the MSU, regional, and national Dairy Challenge events possible. Additional information on the regional and national Dairy Challenge events and a listing of corporate sponsors is available at www.dairychallenge.org.
Things Your Dad Never Told You about Manure

Natalie Rector
MSU Extension Nutrient Management Educator

Manure Management

If you’re like me, you learned a lot from your Dad. On the farm and off, Dad’s advice was usually spot on. While we need to embrace those historical lessons, we also need to remember that the world is a lot different than it was in Dad’s day. Especially when it comes to manure land application, we need to look for opportunities to save money and improve efficiency on the farm.

Same rations as Dad’s?
What goes into a cow determines what comes out. Ration phosphorus (P) inputs rose in the 1970s and 1980s and have since fallen. In recent years, the concern over P limits in manure applications created a renewed interest in lowering P in feed rations. Rations directly impact the P in the manure, and ultimately impact the rate manures should be applied to land. Large farms complying with permits and farms seeking cost-share funds from USDA NRCS in recent years also may have found they needed to reduce P to meet new standards.

The first option must be to consider reducing the P concentration in the ration. Abundant research results now support feeding less P than in past decades. For example, current NRC (2001) recommendations are for ration P concentrations for lactating cows to be between 0.32 and 0.38% of the ration dry matter, depending upon level of milk production.

An easy rule of thumb is that 1 gram of ration P should be provided for each pound of milk produced (Get details in article by Rozeboom and Beede at www.animalagteam.msu.edu/DietModification/tab-id/203/Default.aspx).

Do you feed the non-milking herd the same as the milking herd?
Probably not. Those changes also create very different manure output. The milking herd contributes 85 to 90 percent of the total manure P in the farm. Therefore, if the manure from the non-lactating and lactating groups is collected separately, they should be applied to cropland at vastly different rates. Generally, the bedding is also different for these two groups, and that also impacts the rate per acre for manure applications.

The milking herd manure has more nutrients and is generally more concentrated per ton or per 1,000 gallons. It also is more cost-effective to deliver to crop fields with the lowest P soil test. Those fields are probably farther from the manure storage, but when the nitrogen (N) and potassium (K) are also accounted for at today’s fertilizer prices, hauling becomes more cost effective if the nutrient credits are valued and fertilizer applications are reduced accordingly.

Did Dad test manure? Do you?
Sand bedding has changed many facets of dairy production, including manure. There are systems used for settling, separating and storing sand-laden manure. Manure sampling can help determine the location and concentration of nutrients in your system. That determines application rates.

Are you collecting more rain and wash water?
I’m willing to bet that there is more concrete on your farm than there was in Dad’s day. From old manuring areas to silage bunkers to driveways, concrete plays a big role in runoff. Dairy farms that fall under the NPDES permit must control and contain this water to be in compliance. All farms are encouraged to divert precipitation BEFORE it reaches manure or feed areas.

Between the storm water, wash water and the sand settling in the storages, there is always some form of watery manure with low nutrient concentrations. But often, the agronomic rates for nutrient needs would require too much volume on the fields, resulting in run-off or liquid manure reaching tile drains. That means having to lower the rates to what the soil can absorb and retain. For more information visit www.animalagteam.msu.edu.

Did Dad teach you about organic and ammonium N?
All manures vary in the amount of ammonium N and organic N. The more N in the ammonium form, the more important to inject or incorporate the manure the same day of application to retain as much N as possible. Analysis of manure samples will provide the percentage of each form of N. Generally, about half of the total N in dairy manure is in the ammonium form and the other half is organic.

On hot, dry days, the ammonium volatilizes into the air and is lost within hours. That’s when injection or same-day incorporation is vital. Whenever possible, apply manure later in the fall, when soil temperatures drop below 50 degrees F. This slows or stops the N conversion in the soil, holding more of the manure N in the ammonium form and binding it to soil particles over the winter.

Continued on Page 21
Don’t Run Off Before Learning about Run-off at AG Expo

Beth Steuver
MSU Agriculture & Natural Resources

Before putting your cattle out to pasture, come to Ag Expo at Michigan State University (MSU) and learn how to make simple improvements that can enhance your environmental profile and add to your bottom line.

Mat Haan, project coordinator at the MSU Kellogg Biological Station Pasture Dairy Research and Education Center, will discuss ways to reduce runoff from pastures and show farmers how a constructed stream crossing can save both time and money.

“Spending a little extra up front can save a lot of money in the long run,” Haan says. “When cattle have to pass through a stream, they need a solid walkway to prevent excess silt and sediment from entering the water supply.”

Silt and sediment in the water supply not only affect the surrounding areas but can affect drinking water, other animals and the environment.

Haan says something as simple as managing grass height can not only reduce runoff from pastures but also provide benefits to the soil and improve forage production.

The event, “Profitable Environmental Options for Livestock Producers,” will feature demonstrations at 10 a.m., 11:30 a.m. and 1 p.m. July 21—the first day of the annual Ag Expo at MSU. It’s all happening at the Beef Cattle Research and Teaching Center, at 3200 Bennett Road, Lansing, less than a mile from the main Ag Expo site.

Tim Harrigan (right) will be on hand to discuss how you can improve pasture and hayground with manure slurry-enriched seeding.

Transportation to the Center will be available from Ag Expo, and there is also parking at the Center.

“Our goal is to have special programming for livestock producers but not to monopolize their time,” explains Natalie Rector, MSU Extension nutrient management educator. “We want to make sure that visitors have plenty of time to talk to our experts and tour the Ag Expo grounds.”

But Rector warns that the event will take place only on the first day of Ag Expo—July 21.

“If you come on July 22 or 23, you’re going to miss it,” she cautions.

Ag Expo features commercial farm equipment from throughout the Midwest and several Canadian provinces on the 35-acre main exhibition site and the 40-acre field demonstration area, as well as educational exhibits from several MSU colleges and departments.

It runs from 9 a.m. to 5 p.m. July 21 and 22, and 9 a.m. to 3 p.m. July 23. Admission to the grounds and parking at Farm Lane and Mt. Hope Road are free. For more information about Ag Expo, call 800-366-7055.

Ag Expo is sponsored by the MSU College of Agriculture and Natural Resources.
Maximizing Digestible Intake of Corn Silage-based Diets: Part 1

Mike Allen
Dept. of Animal Science

Introduction

Corn silage is an important source of digestible effective fiber and can be an economical source of energy in diets for lactating cows. However, variation in concentration and digestion characteristics of neutral detergent fiber (NDF) and starch affect supplementation strategies and can affect energy intake and animal performance. One of the most challenging aspects of diet formulation for lactating cows is balancing for carbohydrates.

Adequate effective fiber must be provided to optimize ruminal fermentation. But forage fiber is more filling than other nutritional components of the diet and the filling effect of the diet often limits energy intake of lactating cows. Therefore, diets for lactating cows should be balanced to provide adequate effective fiber with the least filling effect.

A balance must also be attained for ruminal carbohydrate fermentation. Carbohydrate fermentation in the rumen is desirable to provide fuels for microbial growth and production of microbial protein, yet the fermentability of the diet must be limited to prevent excessive production of fermentation acids. Inadequate effective fiber or excessive fermentability of the diet can decrease ruminal pH, feed intake, diet digestibility, and microbial protein production. This is a major problem in many dairy farms that results in poor health, and reduces milk yield and farm profitability. On the other hand, diets with excessive effective fiber that are more filling and diets that are poorly fermentable also can result in lower milk yield and profitability because of reduced energy intake and microbial yield.

Both situations can be thought of as lost opportunity for maximization of farm profits. Corn silage contains about 70% carbohydrate from NDF and starch. The digestibility of the NDF and starch in corn silage is highly variable depending upon genetics, as well as environmental and management factors. Variation in concentration and digestibility of NDF and starch of corn silage provides challenges to maximize energy intake and production.

Concentration of NDF and Starch

The primary carbohydrates in corn silage are starch and the NDF carbohydrates, cellulose and hemicellulose. Grain concentration of corn silage dilutes the NDF fraction, which ranges from <35% to more than 50% (Figure 1). Because of this, starch concentration is also inversely related to NDF concentration and ranges from less than 5% to more than 40% of corn silage DM.

The primary factors affecting concentrations of NDF and starch in corn silage are plant genetics and maturity at harvest (Allen et al., 2003). Corn hybrids range from less
than 38% to over 52% NDF. Other, minor factors affecting corn silage NDF and starch concentrations include environment, population density, harvest height, and fertilization (Allen et al., 2003).

Grain is more digestible than stover so digestibility of corn silage is positively related to its grain concentration. However, grain concentration, as well as concentrations of NDF and starch of corn silage, is not necessarily related to energy intake or animal performance because diets are usually formulated to specific NDF and starch concentrations using supplemental grain. The starch concentration of dairy cattle diets is inversely related to the NDF concentration and concentrations of both are typically in the range of ~26 to 32% of dietary DM for lactating cows.

Effectiveness of NDF
Long fiber particles (effective fiber, mostly from forage) are needed in the diet to maximize production at least four different ways:
1) stimulation of rumen motility, which increases VFA absorption;
2) stimulation of chewing which results in the secretion of salivary buffers;
3) formation of a rumen mat that entraps small particles, increasing their ruminal digestibility; and,
4) provides a consistent source of fuels to the microbes in the rumen which functions to provide a steady supply of fuels to the liver and mammary gland over time.

Effectiveness of fiber in corn silage is dependent upon the theoretical length of cut (TLC) set on the chopper, and further particle reduction if processed, ensiled in bags (from the auger), and during mixing. Furthermore, variation in particle size of TMRs allows selection by cows during eating, particularly for dry rations. Low-lignin corn silages with highly fermentable fiber might be less effective at stimulating chewing than less-fermentable fiber sources (Taylor and Allen, 2005).

Finely chopped corn silage (e.g. 3/8-inch TLC) is less likely to be sorted but requires other forage with longer particles to provide adequate effective NDF in the diet. Coarsely chopped corn silage (e.g. >3/4-inch...
Too Many Cows…?

Christopher Wolf
Dept. of Agricultural, Food and Resource Economics

As of June 9, 2009, the futures market for Class III milk settled at an average of $12.46/cwt for June through December 2009. The futures market brings together the information from market players to arrive at a trade price. Because each transaction has a buyer and a seller, both traders thought that was an acceptable price although perhaps to minimize a loss rather than realize a gain.

The Class III milk futures market, however, has historically performed poorly in predicting large price movements. This is not surprising, nor does it mean that the market is not useful and efficient. The inelastic nature of both supply and demand in the milk market means that a small change in quantity from either side of the market will have a relatively large impact on price.

The inability to predict price changes a couple of months in advance does mean that it is perhaps best for dairy producers to think about milk futures prices as a price that is available rather than a forecast.

For several months, the futures market has been looking for a milk price recovery and then converging downward to settle at lower prices. For example, as of late March, futures contracts for September through November 2009 were available at $16+/cwt but these contracts have since fallen about $3/cwt.

The fact that milk prices have been predicting an upward slope that seems to be consistently delayed, reflects the underlying fundamental fact that producers are losing large amounts of money selling $11/cwt milk with $4+/bu corn and $400/ton soybean meal. The situation is simply not sustainable and milk prices will rise when supply shrinks.

Using the preliminary 2008 values from the Michigan Dairy Farm Business Analysis Summary, $5.62/cwt was spent on purchased feed. Thus, even without accounting for any other expenses—or even homegrown feed costs—it takes 51 pounds of milk at $11/cwt to pay for purchased feed.

By all accounts, demand for dairy products is holding fairly steady. More milk is being sent to cheese vats with kids out of school and spring-calving cows at peak production. U.S. cheese production through the first four months of 2009 was well ahead of 2008 levels depressing the Class III milk price.

Why is supply slow to adjust to the market price signals? In addition to the long-term implications of exiting milk production and culling capital assets (cows) that generally hinder changes in milk supply, there are a couple of key factors muting supply response at the present time: the Milk Income Loss Contract (MILC) program and a lack of opportunities outside of dairy farming.

The MILC program is helping cash flow with payments of $1.50+/cwt. By keeping some farms in business—which is what it was intended to do—the program is delaying or preventing farms and cows exiting production. Previous analysis by the Food and Agricultural Policy Research Institute (FAPRI) estimated that herds with more than 300 cows were net losers from the MILC program while herds smaller than that size gained.

Another factor related to exiting dairy farming is the lack of outside opportunities available. With April unemployment rate of 9.4% nationally and 12.7% in Michigan, there are fewer jobs for dairy managers to consider outside of farming. While there are signs that the recession may be bottoming out, it is likely at least several months from ending. Further, unemployment is a lagging performance measure that is not likely to improve until well after Gross Domestic Product (GDP) begins growing again.

There is not much to be done about either of those factors at the present time. Depending on the demand elasticity, the milking herd must shrink by 250,000 or more cows to get milk prices back to a break-even level. The most recent CWT herd buyout removed 103,000 cows. Another may be on the horizon but the expectation of this buyout may contribute to slowing supply response as farmers might wait for the next buyout rather than exiting the business.
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Adam Lock...

in the Division of Agricultural Sciences, University of Nottingham, UK completing in 2001. For 2 years following that he served as a post-doctoral research associate in the same institution and another post-doctoral experience at the Department of Animal Science, Cornell University, Ithaca, NY between 2003 and 2006.

Lock has produced a litany of published research papers in peer-reviewed journals, popular press articles, reviews and abstracts as well as participated and presented at numerous professional conferences at national and international settings.

Lock has received several honors and awards and belongs to professional organizations including the American Nutrition Society, the American Dairy Science Association, the British Society of Animal Science and the International Dairy Federation.

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Things Your Dad...

**Did Dad use cover crops?**

Well, he was way ahead of his time on this one! The two biggest issues to overcome with manure applications are risk of runoff, especially with winter applications, and risk of manure reaching tile lines.

Besides being potential risks for surface water contamination, while nutrients are washed away and become a pollutant the producer is losing money. A cover crop provides a root system to uptake nutrients and stabilizes soil. The roots also create better absorption of manure into the soil compared to a field of stubble after silage harvest. The top growth will reduce runoff.

The entire system puts organic matter back into soils. And, recent research at the USDA ARS National Soil Tilth Laboratory in Ames, Iowa is finding a positive interaction of the manure nutrients hastening the breakdown of the cover crop in the spring and then releasing nitrogen back to the following corn crop at the peak of crop need. Visit www.animalagteam.msu.edu for more information on rye cover crops.

**An opportunity for you that Dad didn’t have**

If you would be interested in doing plot work with rye, or other cereal grain crops, and manure application this fall, please contact me at rectort@msu.edu or (269) 967-6608.

Dad, grandpa and you all know that manure has value. Grandpa valued it because he didn’t have fertilizer. Dad became accustomed to convenient and inexpensive fertilizers. That’s not the case anymore. Manure has extraordinary value: manage it, credit it and pass the nutrients on to your kids.

Want to learn more about nutrient management? Subscribe to the The Scoop on Animal Agriculture and the Environment by sending an e-mail to stuever@msu.edu with “subscribe” in the subject line.

What’s Happening...

**July - October**

**Michigan Dairy Expo**

July 20-24
MSU Pavillion, Michigan State University
East Lansing
Contact: Carla McLachlan, 517-432-5402

**Ag Expo**

July 21-23
Michigan State University
East Lansing
Get more at: www.ageexpo.msu.edu
or call 1-800-366-7055

**Forage Demonstration Day**

July 25
MSU Experimentation Station
Lake City
Contact: Janice Rumph, 231-389-3001
or Dave Stroud 231-839-4667

**Artisan Workshop: Cheese Making with Peter Dixon**

August 4-6
MSU Dairy Foods Complex
Contact: John Partridge, MSU Dairy Food Ext. Specialist
517-355-7713 x179 or partridg@anr.msu.edu
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Maximizing Digestible Intake of Corn....

TLC) will increase the effectiveness of NDF from corn silage but will also allow sorting by cows. Optimum particle size of corn silage is dependent upon many factors including the fermentability of the diet, and the effectiveness of other forages in the diet.

NDF Digestibility
Corn silage NDF digestibility measured in vitro is extremely variable. Allen (1993) reported that in vitro NDF digestibility (IVNDFD) of whole plant corn forage ranged from approximately 60% for 32 corn hybrids grown in four locations in Michigan in 1988 and 1989 (Figure 2). This variation was primarily from differences in growing environment between years and locations and in hybrid genetics.

“A one-unit increase in NDF digestibility in vitro or in situ was associated with a 0.37lb increase in DMI of diets and a 0.55 lb increase in 4% fat-corrected milk. However, increased IVNDFD does not always result in increased feed intake...”

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Climate Change and Cows...

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Farms that use perennial pastures with managed grazing systems are especially carbon-friendly because they use a minimum of fossil fuels, legacy carbon, to produce the feed and the “pasture crop” is a perennial crop. The bottom line is that we want our cropping system to capture or sequester carbon and increase the organic matter levels in our soil.

Don’t get caught up in trying to defend our dairy cows by saying they are more efficient today or that we use fewer cows per hundred weight of milk produced because that is admitting cows are the problem.

Dairy cows are not the cause of climate change. If we manage the cows and their feed production properly, cows actually can help us take carbon out of the air and store it in the soil. There are some production systems that will release more carbon than is captured; burning the rain forest for cow pasture, poor management of nutrients in cow manure, and feeding cows grain from systems that are depleting the soil’s organic matter, are examples.

If there is a problem it is not the cow, but the way we manage the farm system and its carbon cycle. Dairy farmers have the responsibility to be good stewards of the land and livestock for the benefit of the land, the livestock, the public, and themselves.

Environmental issues will become more important and we need to make sure people understand that cows and dairy farming are part of the solution and not part of the problem. Quit defending cows when they don’t need defending. Tell people how cows are helping our farming systems to be more environmentally friendly and more sustainable.

Management factors such as population density, soil fertility, planting date, and harvest moisture were relatively constant among plots but, if allowed to vary, would increase variation further. Although the growing environment is the greatest factor affecting NDF digestibility of corn silage, there are consistent hybrid effects (Allen et al, 2003).

Typical commercial corn hybrids vary by 4 to 5 percentage units of NDF digestibility while the brown midrib mutants increase this variation by another 4 to 5%.

Other factors have somewhat less effect on NDF digestibility; in vitro NDF digestibility decreased by about 4 percentage units as forage dry matter increased from 30% to 41% and increased <1.5 percentage
units as plant population increased from 18,000 to 34,000 plants per acre (Allen, 1992).

These relatively small differences in in vitro NDF digestibility can have large effects on animal performance. Oba and Allen (1999a) reported that enhanced forage NDF digestibility increased dry matter intake DMI and milk yield of dairy cows across a wide range of forages reported in the literature.

A one-unit increase in NDF digestibility in vitro or in situ was associated with a 0.37-lb increase in DMI of diets and a 0.55 lb increase in 4% fat-corrected milk. However, increased IVNDFD does not always result in increased feed intake.

Response in intake to forages with increased IVNDFD digestibility is dependent upon both animal and dietary factors; response is greatest for animals with high energy requirements and diets lower in energy (Allen, 2000).

Oba and Allen (1999b) compared production responses of 32 cows with high milk yield (100 lbs per day) fed a low lignin brown midrib-3 corn silage compared with its isogenic normal control corn silage in diets containing 45% corn silage, 11% alfalfa silage, and energy and protein concentrates in a crossover experiment.

In vitro NDF digestibility (30-hr incubation) of the low-lignin corn silage was 9.7 percentage units higher than the control silage. Dry matter intake and 3.5% FCM yield were increased by 4.6 and 5.7 lb per day, respectively, when the corn silage with higher IVNDFD was fed.

Dry matter intake and milk yield responses for the low-lignin corn silage were linearly and positively related with pre-trial milk yield suggesting that DMI of greater producing cows was limited by physical fill to the greatest extent.

It is important to note that although the low lignin brown midrib-3 corn silage had 9.7 units greater in vitro NDF digestibility than the normal corn silage, the difference in NDF digestibility in vivo ranged from about 15 units lower to about 15 units higher for the brown midrib-3 corn silage.

Furthermore, the response in NDF digestibility in vivo was linearly and negatively related to response in DMI. Therefore, NDF digestibility measured in vitro or in situ is not a reliable indicator of energy concentration but it is related to dry matter intake.

In vitro digestibility of corn silage NDF was not related to concentration of NDF and was not highly related to concentration of acid detergent fiber (ADF) in the whole plant for 32 corn hybrids grown in several locations in Michigan in 1988 and 1989 (Allen et al., 2003).

However, acid detergent sulfuric acid lignin as a fraction of NDF was highly related to IVNDFD for the same corn forage samples (Allen et al., 2003). Because lignin is more easily and economically measured than IVNDFD, it might be a useful index of ease of NDF breakdown for use in the field.

References available upon request to the author at: allenm@msu.edu.
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