Weathering the Storm

Falling milk prices are affecting dairy producers in Michigan and across the nation. How serious is the problem, what caused it, and what can dairy producers do to weather the storm and maintain the vitality of their dairy businesses? This article attempts to answer these questions and offers specific methods for sound planning during tough economic times.

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Dairy producers from California to Maryland and Michigan to Florida are in dire financial stress as milk prices plummet (1, 2, 3, 4, 6, 7, 10, 13). Mailbox milk prices in California recently dropped below $10/cwt for many producers when it recorded the largest one-month drop in 54 years (2). The California Department of Food and Agriculture’s latest cost of milk production estimate for Golden State producers is over $19/cwt (2). At these prices most California producers are not even able to cover their feed costs, much less all the other inputs (e.g., labor, interest, utilities) necessary to produce milk. Reports indicate many producers are losing as much as $150-$200/cow per month (2, 6). The situation has become so critical in California that Mike Marsh, CEO of United Western Dairymen said, “This could destroy our dairy infrastructure.” Similar scenarios are developing for dairy producers all over the nation including here in Michigan (3, 4, 10).

Causes of the Crisis

Why is the dairy industry in this situation? A number of factors have converged to produce the proverbial “Perfect Storm.” The record high milk prices of 2007 and 2008 fueled expansion of the U.S. dairy industry. Milk cow numbers in the U.S. are now at almost 9.3 million head and milk production for 2008 set a new record high just short of 190 billion pounds (2.4% increase over 2007). For most of this period a dramatic increase in U.S. dairy exports was able to absorb the increased milk production. In fact, for most of 2007 and...
2008 the U.S. enjoyed unprecedented dairy trade surpluses. However, a number of factors (world economic crisis, strong U.S. dollar, increased milk production in Australia and New Zealand, reinstatement of EU dairy export subsidies, tainted milk scare in China, etc.) have drastically slashed U.S. dairy product exports with recent months all experiencing increasingly greater dairy trade deficits. Domestic consumption of dairy products also has been weak for many months. Consumption of the industry’s mainstay, cheese, normally increases at about 2.8% per year, but in 2008 it was essentially even with 2007 (+0.01%). U.S. consumers are staying home and eating out less. Around 60% of total U.S. dairy products are consumed in restaurants and the food service sectors. Therefore, when Americans decide to eat out less, dairy product consumption suffers.

Effects for Michigan Producers
Michigan dairy producers are not immune to this downturn. From January 2007 through December 2008 the USDA mailbox price for Michigan averaged $18.33/cwt (Figure 1). Your mailbox price was likely higher since the USDA’s calculation of mailbox prices deducts marketing costs (e.g., milk hauling, promotion fees, CWT assessment) and is calculated at the average milk quality for the state. Over the same time period production costs dramatically increased. Data from the most recent Michigan Dairy Farm Business Analysis Summary (12) (Figure 2) indicates average total milk production costs increased 36.3% in 2007 versus 2006. Some production costs have moderated since 2007 (e.g., fuel and oil) but overall costs remain high. The USDA milk:feed ratio, which measures how many pounds of feed can be purchased with a pound of milk, has been below 3.0 (i.e., less ‘profitable’) for 15 consecutive months and below 2.0 for 10 of the past 12 months. February’s

Figure 1: USDA Michigan Mailbox Milk Price, 1996-2009 (Prices from January to December 2009 are forecasted based on current Class III futures prices (as of 4/3/09) and average Michigan basis from 2003-2008).
milk:feed ratio set a record low of 1.44! My calculations (using USDA figures) for February indicate income over feed costs are down over 67% versus February 2008 leaving the typical dairy producer with $7.16 less income per hundredweight to pay non-feed bills.

USDA mailbox prices for Michigan (Figure 1) in 2009 (as of 4/3/09) promise to average only $11.31/cwt the first six months and $15.51/cwt for the second six months ($13.41/cwt for the year). Even when adding back typical marketing costs ($0.45-$0.90/cwt), there is little hope the “average” Michigan dairy farm will experience any profitable months in 2009 unless the overall U.S. milk supply shrinks dramatically and/or domestic dairy product consumption makes an unanticipated comeback. There is hope of the former because as of 3/7/09 the USDA reported that 108,400 more dairy cows had been slaughtered in federally inspected plants versus the same period in 2008. Additionally, on 4/3/09 the CWT program announced they would be taking bids for their seventh “herd retirement” program. Also, milk per cow output in the U.S. has been increasing below trend for over a year. Perhaps declining cow numbers coupled with below trend milk per cow will reduce total U.S. milk output enough to improve milk prices in the last half of the year.

So, how can your dairy operation weather the storm? First, there is no one “magic bullet.” Second, hopefully during the profitable times of 2007 and 2008 you paid down some debt and salted some profit into savings. Because regardless of what strategies one may employ, the words of one California dairy producer ring true when he said, “For dairy farmers it’s just a matter of how much equity they want to burn up to stay in business,” (6).

Major Principles

Before listing specific strategies to help you weather this storm there are four over-arching principles you should always keep in mind.

#1: Know Where You Stand; Know Where You Are Going. Before making changes on your operation it is critical to know where you stand and develop a plan for where you are going. Therefore, perform a complete business analysis of your farm operation. Routine business analysis is something good managers should be doing all the time, but it is especially important when margins tighten. A complete business analysis will allow you to calculate your cost of production and benchmark your farm’s performance so you know how you compare to industry standards. Without this analysis it is nearly impossible to identify where your greatest opportunities lay to increase revenue or cut costs. For example, Michigan Dairy Farm Business Analysis Summary data in Figure 3 show the ten largest cash expenses for 2007. How does your farm compare? Also, Figure 3 provides a guide as to where your emphasis should be on cutting costs. For example, a 10% cut in purchased feed costs would save over $0.58/cwt while a

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10% cut in fuel and oil costs would only save $0.10/cwt. This analysis will allow you to challenge every enterprise and every expense on the farm.

Knowing your farm’s past performance also provides key information to formulate budgets for the future. At a minimum you should formulate a monthly cash flow budget for 2009. You also might want to consider several cost saving measures and/or technology changes (e.g., change rations, install sand bedding, switch from 2X to 3X milking). You should calculate “what if” scenarios incorporating these potential changes as a key step in determining their feasibility.

#2: Marginal Costs Versus Marginal Returns. Be extremely careful when cutting costs, because minimizing production costs may not necessarily result in higher profits. Instead, the key is to make each decision based on its marginal effect. In other words, you may cut costs by $1.00/cwt, but it doesn’t make sense if those cuts cause you to lose $1.50/cwt in milk revenue. So be careful, don’t cut costs merely for the sake of cutting costs! Make sure that you don’t lose more revenue than you gain in cost savings.

#3: Don’t Take Added Investment Off the Table. In times of economic stress don’t overlook the possibility added investment may help you become more profitable. That’s applicable for everything from feed additives to improved facilities. If the return from the investment exceeds the additional cost then give serious consideration to making the plunge. However, delay the investment until better economic times if the positive marginal return is not immediate.

#4: Cutting Feed Costs Has Consequences. As the old saying goes, “Don’t be pennywise and pound foolish.” Thus, don’t automatically assume cutting feed costs will lead to more profitable rations. Remember that numbers and a “balanced” ration are not the final arbiter. You must monitor feed intake and milk production before and after diet changes to insure any cost savings are not negated by lost milk and/or solids production. Since this is the case, avoid wholesale ration changes. Otherwise, it will be impossible to determine whether a single ingredient’s subtraction or addition was helping or hurting.

When considering alternative feeds be sure to compare “apples to apples” by comparing competing feeds on cost per pound of dry matter, cost per Mcal of net energy for lactation, and by taking account of differences in protein (e.g., by comparing on a “corn-soy value” basis). Here are some important questions to ask when considering alternative feeds:

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Figure 2: Average cost of milk production for Michigan dairy farms from Michigan Dairy Farm Business Analysis Summary (12)(cost after accrual adjustments and adjustments for production of non-milk sources of income).
How much of the feed must a cow eat to obtain equal energy and protein?
How much effective fiber is in the feed?
What is the energy source in the feed (e.g., starch, sugar, fiber, fat, protein)?
How much of the feed’s protein is degraded in the rumen? How much is bypass?
What is the feed’s mineral and vitamin content?
Does the feed have any attributes that limit the amount fed?
Will the feed alter dry matter intake?

Tips for Weathering the Storm
Finally, below is a list of tips that may help you weather the storm. My thanks goes out to fellow MSU Extension educators Dennis Stein, Bill Robb, and Phil Taylor for developing some of the items on the list. The list is not exhaustive, but should provide you with a good start. These are some of the most difficult times in the dairy industry, so examine the list very carefully and apply them to your operation if they fit. This “Perfect Storm” is certainly intense. Let us hope its intensity will make it brief so dairy producers can see profitable prices by the second half of 2009.

Dairy Herd Management
- Cull cows that are not bred back, have chronic problems, and are below breakeven production levels.
- Evaluate your cost of raising heifers and if it is too high consider contract-raising programs with other producers.
- Do not cut out management services like DHI and custom breeding services, but make sure you are utilizing these programs for maximum benefit.
- Consider 3X milking: University of Maryland research (8) suggests an advantage of about 8 lbs milk/cow per day for 3X milked cows versus 2X. 3X milking may also more efficiently utilize your labor force and facilities and improve milk quality. For a spreadsheet to analyze whether 3X fits your farm send me an e-mail (thomasc@msu.edu).
- Make sure you are capturing all possible milk quality premiums. Most changes needed to produce top quality milk require little outlay of cash.
- If your milking cows are not exposed to light for at least 16-17 hr/d consider adding supplemental lighting. Studies

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Top Ten Michigan Dairy Farm Cash Expenses

![Bar chart showing the top ten cash expenses per hundredweight from 2007 Michigan Dairy Farm Business Analysis Summary (12).]

- Purchased Feed: $5.32
- Hired Labor: $3.07
- Repairs: $1.45
- Interest: $1.24
- Fuel & Oil: $1.00
- Fertilizer: $1.00
- Livestock Supplies: $0.75
- Custom Hire: $0.75
- Livestock Marketing: $0.75
- Land Rent: $0.68

Figure 3: Top ten cash expenses per hundredweight from 2007 Michigan Dairy Farm Business Analysis Summary (12).
(9) have shown that supplemental lighting can increase milk production by 5-16%.

- Be ready for warm weather by making sure your barn and holding pen are adequately ventilated and have fans for heat stress abatement.
- Are your cows comfortable? Sand bedding remains the “gold standard.” Many producers report as much as a 5 lb/cow per day increase when switching from mattresses to sand.
- Inventory your current feed supply, project your feed needs, and then determine if you may have surplus feed that could be marketed.
- Review and re-balance all your feed rations and avoid over-feeding. Keep fresh feed pushed up to maximize feed intake and milk production.
- Consider cheaper alternative feeds and removal of expensive feed additives, but don’t forget feeding advice given above.
- Save feed by keeping your silages covered and maintaining a well-managed face on all bunks. Properly covered silage gives an 8:1 return for the investment in covering.
- Watch grain storage conditions! Air temperatures are rising and solar radiation is increasing as the sun marches northward. This can create an environment detrimental to grain stored in bins. Therefore, make sure grain bins are properly aerated.
- Inventory your calves, heifers, springers, and fresh cows and consider selling any surplus animals.
- Monitor hired labor hours and manage to increase labor efficiency.
- Don’t hide your financial crisis from your employees. In fact, your employees may be one of your best sources for providing cost cutting solutions and/or increasing efficiency.
- Make sure excessive rain run-off and snow melt are diverted from your manure lagoon. Proper run-off management means less gallons of manure to haul. ‘Custom Hire’ is in the top 10 dairy cash expenses and most of it is custom manure pumping. Savings can mount up quickly!
- Consider using a higher percentage of less expensive young sires in your breeding program to reduce breeding costs.
- Make sure all lights are turned off when not needed.

Financial Management

- Market your milk! Did you know that if you would have forward contracted your 2009 milk production early last summer (6/18/08) your mailbox price average for 2009 would be over $22/cwt?!! Hindsight is always 20/20, and it is impossible to predict when the market puts in a high. But, dairy producers that are savvy marketers forward contracted a significant portion of their 2009 milk production when prices were at record highs. On most Michigan dairy farms milk income accounts for over 85% of total cash farm income. You cannot afford to be a “price taker.” Become a “price maker” by marketing your milk with such tools as forward contracts, futures contracts, and options contracts. MSU Extension sponsors a monthly marketing education meeting in Sandusky and St. Johns. Send me an e-mail if you are interested in attending (thomasc@msu.edu).
- Determine your cost of production and then forecast how much cash you will need until your operation reaches positive cash flow. Then present your plan and needs to your banker so you can secure operating money. Do it sooner rather than later!
- Consider refinancing, rolling short term debt into longer term, locking in interest rates on adjustable rate loans, and asking creditors to defer principal payments. Resist the temptation to charge operating expenses on credit cards. Be extremely careful with credit cards due to their high interest and huge impact they have on your credit rating if you miss a payment.
- Challenge every expense! Is it necessary? How much can we do without?
- Review your entire farm’s insurance needs and put out bids. Significant savings can be found, especially with companies that offer new policy discounts. However, make sure you maintain adequate coverage and that new, cheaper policies are providing comparable coverage to current policies.
- Offer landlords new options for land rental agreements to share some of the risk and rewards; consider arrangements such as cost share, flex rents, and fixed crop share agreements.
- Control capital purchases by delaying new equipment purchases where possible.
- Consider selling unproductive assets that are not generating income, including unproductive land, unused or under-utilized equipment, timber, and scrap metal.

Crop Management

- Focus on producing high quality forages in 2009. Forage quality will always be the foundation of profitable dairy farming. Be sure to cut both alfalfa and corn silage at the proper stage of maturity and dry matter for maximum quality. Also, use tools like MSU’s Compicker® computer program to aid you in selecting the best corn silage hybrids for your farm.
Reduce tillage operations where and when possible to lower machine and labor costs.

- Re-evaluate your weed control program to make sure it makes economic sense.
- Control deer damage with block permits, and leasing the farm to additional hunters.
- Select corn grain and corn silage hybrids that give you the traits that work on your farm at the best price.
- Perform soil tests to know your usable nutrient values and be sure to take advantage of manure nutrients instead of purchasing commercial fertilizer.
- Perform side-dress soil sampling to take advantage of your organic nitrogen sources.
- Do not be afraid to use up some of your surplus phosphorus and potassium in the soil profile.

Things that are Necessary to Continue Being Successful:

- Don’t hesitate to seek professional help. For example, MSU Extension Dairy Educators have a wealth of resources to help you analyze and optimize the management of your operation.
- Be a stickler for details! Successful dairy farmers have always been, and will continue to be, those who pay attention to details!
- Maintain a sound herd health program by meeting with and laying out a good herd health plan with your veterinarian.
- Maintain a sound equipment maintenance schedule to keep things running in the best condition possible.
- Consider leasing your farm land for oil and wind development and if you have high deer numbers lease land out to hunters.
- Prepare for the impact of inflation as a result of the current financial crisis.

References


MSU Extension Dairy Educators have a wealth of resources to help you analyze and optimize the management of your operation.
While total milk production and number of dairy cows declined significantly in many states over the last 5 years, Michigan is headed in the other direction. Michigan’s total milk production increased 19% and the state’s dairy herd increased from 302,000 to 335,000 cows between 2003 and 2007. Quite remarkably, over the same time period milk production per cow increased substantially (Michigan Ag Statistics).

Michigan currently ranks 4th in the U.S. and 1st in states east of the Rocky Mountains in milk produced per cow, averaging 22,681 lb/cow in 2007 (USDA Statistics). This is a testament to the high-level skill and innovative nature of Michigan dairy farmers, their consultants, and the allied industries. Michigan producers have taken advantage of the biological and technological advancements in genetics, reproductive management, nutrition, cow comfort, health and well-being, and information management through one of the most extensive dairy support systems in the U.S.

Even though dairy herds in Michigan are becoming larger, just like in the rest of the country, our dairy producers are finding ways to make their cows more efficient. The more effectively we can select, feed and manage dairy cows the more profitable and sustainable dairy farms will be (see companion article, page 10). Michigan also ranked 1st in gross revenue per cow (pounds of milk produced X all milk price) in 2007.

Not only do these metrics indicate progressiveness, but they also infer that our producers know how to take the very best care of their animals. There is a very strong correlation...
between milk production per cow, and cow health and welfare. This bodes well for the future of the dairy industry in Michigan. Only the very progressive (and innovative) producers will survive tough economic times and we are fortunate to be in a state that traditionally can compete at a very high level and maintain a vibrant dairy industry.

Because of the progressive and ever resilient nature of our state’s producers, dairy farming is a very significant revenue generator and multiplier in Michigan’s economy. In 2007, milk accounted for nearly 26% of the total $5.7 billion (that’s with a ‘B’) in cash receipts from the top 20 agricultural commodities in Michigan (Figure 1, page 8). Based on a recent MSU Product Center summary of information from 2003 through 2007, Michigan dairy cows produced milk revenue worth $1.9 B annually. Coupled with $4.0 B in annual economic activity from the state’s dairy foods manufacturing sector, the dairy industry generated total annual average revenue of $5.9 B (Figure 2). This is big, nearly 10% of Michigan agriculture’s total annual $60 B plus contribution to the state’s economy.

Dairy farming is a very significant revenue generator and multiplier in Michigan’s economy.
Opinion
Michigan Dairying: The Sustainability Challenge Ahead

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The trends and metrics on pages 8 and 9 are an impressive tribute to the collective efforts of many involved in Michigan’s dairy farming-food production system. From here, what’s ahead?

From where I stand one of the most pressing challenges for the industry in the next few years will be to very publicly articulate its mission and active engagement as an essential partner in the social (first), environmental (second), and economic sustainability of Michigan.

The dairy industry has had a remarkable impact by improving milk production efficiency and fostering sustainable food production. Now it (and the state of Michigan) can benefit greatly by championing its past and future roles and successes as a partner in practicing and fostering sustainable dairy farming. Until recently the sustainability ‘frame of reference’ just wasn’t given much importance by the majority of the dairy industry. But, now large commercial entities are really pushing ‘green’ sustainability. Commodity and niche dairy businesses should take advantage of this attribute. Dairy production always has been part of the sustainability solution. That must be highlighted more!

Take this simple example.
Currently there’s a lot of sensationalized media chatter about greenhouse gases from cows and global warming. Public perception is that dairy cows ‘belch’ methane, causing global warming. I personally believe that the science is quite strong supporting increased greenhouse gas emissions causing global warming. And, if not reduced significantly during the next 30-50 years, global warming will result in major irreversible climate changes. However, the insinuation that cows are somehow this major new contributor to greenhouse gases and global warming is flat-out wrong.

Last summer at our national dairy science meetings, Garcia and Linn (2008) reported work where they modeled methane emissions of the 1924 U.S. dairy cow population compared with the 2007 population. There were 21 million dairy cows in 1924, each averaging 4,162 lb of milk versus 9.15 million in 2007 averaging 20,267 lb/cow. A single cow in 2007 produced about 60% more methane than a single cow in 1924. This is where the public-media spin usually stops --- these modern cows produce a lot of methane and cause global warming. For sure there is some methane contribution from cows, but here’s the rest of the story…..

First, methane production per pound of milk produced is about 68% less in 2007 (cows in modern production systems with advanced technologies and management practices) compared with 1924 cows. Today’s cows are incredibly more efficient. Even more importantly, because there are less than half as many cows today that are over 5-times more productive than their ancestors, total tons of methane emitted by dairy cows is 39% less now compared with 1924.

The National Research Council (2003) reported that about 18% of total methane emission is from all agricultural animals. In contrast, 54% of total emissions are from production and burning of fossil fuels and biofuels, and 24% is from landfills. For the vast majority of Americans fuels and landfills are much closer to their everyday lives than cows. That’s not so “comfortable” to think about. And, it’s not nearly as sensational for the media as portraying imagines of cows belching clouds of methane.

The Michigan dairy industry must earnestly share its mission and engage with the public as a major partner and contributor for sustainable food production. Actively engaging in social, environmental and economic sustainability will be part of a continuing vibrant Michigan dairy industry. If done well and communicated effectively by dairy farmers and other advocates for the industry, sustainability will be fantastic for business and make dairying a mainstay of Michigan’s future!
Dairy farms generate milking center wastewater from the milking parlor and the milk house. This wastewater typically has low concentrations of water contaminants and, unlike manure, has little economic value. This article reports the results of a 3-year study to examine milking center wastewater management alternatives for small-sized Michigan dairy farms. The study concludes that the bark filter mound method may have potential for effective use in the future.

All dairy farms, regardless of size, generate milking center wastewater from the milking parlor and the milk house. Such wastewater typically contains low concentrations of manure, milk residue, food grade cleansers, and other water contaminants. Unlike manure, which contains economically-useable levels of crop nutrients, milking center wastewater has little fertilizer or economic value. Dairy farms generate 2 to 11 gallons/day/cow of milking center wastewater. A previous MDR article (Safferman, S. I., Milking Facility Wash Water: Facts and Figures,” Michigan Dairy Review, January 2008, pp. 1-2) contains a literature review concerning the quantification and characterization of milking center wastewater.

The challenge of managing milking center wastewater is compounded for farmers who manage their dairy manure as a solid. Without a liquid manure storage facility to contain manure and the milking center wastewater, few options for milkhouse wastewater management are available, other than frequent hauling to crop fields or through conventional septic systems. The vast majority of farms with fewer than 100 milk cows manage manure as a solid. Therefore, this challenge falls disproportionately on smaller dairy farms that do not have liquid storage systems. The 2002 Census of Agriculture shows that over 70% of all dairy operations in Michigan have fewer than 100 milk cows (2,172 out of 3,013), making this a widespread concern. These dairy farms need environmentally protective management options that are affordable and easily operated and maintained.

In 2004, the USDA Natural Resources Conservation Service and the Michigan Department of Environmental Quality organized a multi-agency workgroup to examine milking center wastewater management alternatives for small-sized Michigan dairy farms. Workgroup participants are listed at the end of the article. After a nearly 3-year on-farm field trial, the workgroup concluded that one alternative, the bark filter mound, has good potential, but further experience at dairy farms of different sizes, soil types, and management practices is needed before broad application of the practice can be recommended.

**Bark Filter Mound**

The bark filter mound has been tested in other states but has not become a widespread practice due to technology limitations and operational problems. Although there are variations in features, they all incorporated similar principles. The milking center wastewater passes through a settling tank and fat trap to capture solids and milk fats, which are periodically land applied at agronomic rates. The wastewater is then dispersed into an infiltration area, sized according to water volume generated and soil type. The infiltration area is covered with organic matter, usually bark or wood chips, that serves the following functions:

- Permit oxygen penetration to promote aerobic microbial treatment.
- Insulate the infiltration area preventing freezing.
Minimize offensive odor generation due to sorption by the organic matter.

Because the wastewater is dispersed above the top soil, natural filtration, sorption, and microbial degradation contribute to treatment as the water progresses downward. This is in contrast to the septic system and leach field approach, where the wastewater is distributed in the subsoil, bypassing the biologically active topsoil.

After studying the use of bark filter mounds in other states, the workgroup determined the need to implement the following modifications:

- Apply wastewater so it passes through the filter media in order to enhance treatment.
- Test a variety of filter media in order to determine which is most effective.
- Disperse the wastewater evenly within the filter mound using a pressurized system.

Design of Modified Filter Mound

A progressive small farm in central Michigan was found that welcomed the field demonstration. This farm has approximately 200 milk cows and produces approximately 5 gallons per cow per day of milking center wastewater when milking twice a day. The field trial filter mound system tested four filter media: bark, wood chips, marble-size Styrofoam chips, and pea stone.

Before entering the filter mound system, wastewater flows, by gravity, through a series of three settling tanks sized to provide a total capacity of at least three times the daily wastewater production to ensure adequate settling. After the settling tanks, a timer-controlled pump sent the wastewater to the pressurized pipe distribution network to dose the 3-foot deep mound of filter media. There were four sections of the filter mound, each with a different media. A sequencing valve was used to ensure the equal, sequential distribution of the wastewater to each section. The distribution system in each section consisted of four lines of 1.5-inch diameter PVC pipe. In three test sections, the distribution lines were covered with a half-round 8-inch, dual-wall corrugated plastic pipe. In the fourth section, 24-inch wide by 18-inch high polyethylene effluent chambers were installed over the distribution lines to provide a wider spreading area and to allow more air into the surface of the filter media. All lines were laid deep enough in the mound to protect against frost. Figure 1 is a photograph of the mound being constructed and Figure 2 shows the distribution line, spraying under the 8-inch half round pipe, in the bark section.

The field trial filter mound was located on a Metamora sandy loam soil. These soils do not have a natural layer of lower permeability near the surface (siting is critical so that the topsoil becomes an integral part of the system and ponding at the base does not occur). The base of the filter mound was approximately 20 feet wide, but the area towards the top of the mound, receiving wastewater, was estimated to be approximately 15 feet. There were four sections of the filter mound, each 50 feet long, and each with a different media. Consequently, the total area receiving wastewater was approximately 3,000 square feet. At 1,000 gallons per day of production, the application rate was approximately 0.33 gallons per square foot per day. Figure 3 is a photograph of the completed bark section in the background and wood chip section in the foreground. Due to the complexity of the system and to maximize the chance of successful operation, it is essential that installation of the entire system is performed by a qualified contractor and in accordance to the developing standard.

Photo courtesy Fred Gasper

Fig. 2. Distribution line spraying under round pipe.

Fig. 3 Completed filter mound.
Wastewater Characteristics and Treatment Results
Starting in the fall of 2005, wastewater samples were routinely collected every 1 to 2 months from the following locations.
- Pumping chamber.
- In the filter mound, 1.5 feet below the distribution line.
- At the natural ground surface (approximately 3 feet below the distribution lines).
- Approximately 2 feet below natural ground surface.

Samples were analyzed for nitrogen (ammonia and nitrate), phosphorus, bacteria (measured as the surrogate E. coli), solids, oxygen demanding substances (chemical oxygen demand – COD), and two metals of interest to groundwater quality (manganese and iron).

The results show the bark is an effective treatment media for nitrogen, phosphorus, E. coli, and COD. Removals of all were routinely above 90%. The wood chip media provided only marginal treatment and little treatment occurred through the Styrofoam chips and pea stone. The remaining discussion is limited to the bark filter media because of its treatment effectiveness.

Field Trial Filter Mound System Operation
The field trial filter mound was operated for nearly 3 years. Approximately a year after installation the farm increased to 3 milkings per day. Shortly thereafter, suspended solids (primarily hair and undigested silage fibers) clogged the brush filter, pump screen, and distribution lines. To control the accumulation of solids in the wastewater, the following modifications were made and proved to be very effective.
- Installation of a pipe baffle at the exit of the first settling tank.
- Installation of slit-opening screen filter at the outlet of the second settling tank.
- Cleaning of the milking parlor sump (approximately 3-feet long, 2-feet wide, 18-inches deep) after every 9-12 milkings.

The bark filter mound section settled one foot during the first year of operation but thereafter, settling was insignificant. Digging into the bark below the distribution lines showed only minimal decomposition. Consequently, the usable life of the bark is expected to be at least four years.

In consideration of the experience with this field trial filter mound, the recommended maintenance schedule is presented in Table 1.

Conclusions
The bark filter mound has the potential to be an effective alternative for managing milking center wastewater based on this proof-of-concept demonstration. Before broad application can be recommended, further research at dairy farms of different sizes, soil conditions, and management practices is needed to develop siting and design guidance and operation and maintenance procedures.

The workgroup has identified other potential demonstration sites and is actively seeking funding to install and monitor at least two more bark filter mound field trials in order to answer these questions.

Workgroup participants include: Thad Cleary, Geoff List, Joe Rathbun, and Angela Strong of Michigan Department of Environmental Quality; Stephen Davis, Suzanne Reamer of USDA Natural Resources Conservation Service; Ted Loudon, Del Mokma, Steven Safferman of Michigan State University; Dale Ledebuhr of Michigan Milk Producers Association; Ben Foster of Michigan Land Improvement Contractors of America; Gary Fritz of Clinton Conservation District; Dann Bolinger of Pioneer Seed Company (formerly Michigan State University Extension); Kristine Foight of USDA Agricultural Research Service (formerly Clinton Conservation District); Michelle Crook of Michigan Department of Agriculture; William Northcott of Michigan State University Extension.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Frequency</th>
<th>Estimated Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean Filters</td>
<td>1/month</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Replace Brush Filter</td>
<td>1/year</td>
<td>10 minutes</td>
</tr>
<tr>
<td>Clean out Sump in Milking Parlor</td>
<td>2/week</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Visual Inspection of Mound</td>
<td>1/week</td>
<td>5 minutes</td>
</tr>
<tr>
<td>Pump Settling Tanks and Spread Liquid at Agronomic Rates</td>
<td>1/quarter</td>
<td>6 hours</td>
</tr>
<tr>
<td>Flush Distribution Lines</td>
<td>1/quarter</td>
<td>1 hour</td>
</tr>
<tr>
<td>Check of Pumps, Floats Hydrotek Valve, and Pump Controls (most likely by a contractor)</td>
<td>1/year</td>
<td></td>
</tr>
<tr>
<td>Replenish/replace Bark</td>
<td>Once every 4-5 years</td>
<td>12 hours</td>
</tr>
</tbody>
</table>
Having to Dismiss a Dairy Farm Employee

Vera Bitsch
Dept. of Agricultural, Food, and Resource Economics

Dismissal is the involuntary termination of an employee’s employment (1). Because of the involuntary character of the situation, emotions often are high on both sides and require dismissals to be handled with great care—or to be avoided. How can managers avoid dismissals? Careful selection, training, and management decisions will serve to reduce the number of dismissals. In any case, a dismissal should only be considered after other options have been tried and did not lead to the desired results.

Except in cases of gross misconduct, the dismissal should not come unexpected to the employee. Managers need to make sure that sufficient opportunities for behavioral changes were provided and a fair disciplinary process was followed (coaching and discipline procedures will be addressed in future articles). In addition, regular evaluation of an employee’s performance and a paper trail regarding performance appraisals and disciplinary actions are essential should a terminated employee challenge the dismissal in court.

Wrongful Discharge

Michigan is an at-will employment state. What this means is that in the absence of a contract stating otherwise, the employee can resign at any time and for any reason and the employer can terminate for any reason or with no reason. However, in the past 50 years, the common law based at-will doctrine has eroded in several ways. Therefore, a terminated employee may file a wrongful discharge suit against his or her former employer, causing substantial costs for dealing with this situation, even if the employee does not prevail in court.

Nationwide there are three major exceptions to at-will termination (2); two apply in Michigan: the public-policy exception and the implied-contract exception. The public-policy exception prevents employees from being terminated for an action that supports a State’s public policy, based in the State’s constitution and statutes. For example, civil rights and equal employment opportunity legislation prohibit discharge based on an employee’s protected characteristics, including race, color, religion, sex, national origin, age, and disability status. Other examples are the reporting of dangerous workplace conditions, and the refusal to break the law on the employer’s request.

The implied-contract exception is brought on by an employer’s oral or written assurances with respect to job security or disciplinary procedures, which can create a contract even though no explicit written contract relationship exists. For example, an employee handbook describing procedures to be followed if disciplinary action becomes necessary or statements to the effect that no employee will be fired without just cause create an implied contract, under which the employer cannot terminate an employee without following the described procedures. An implied contract is created also, if a manager in charge of hiring or the employee’s supervisor tell an employee that his or her employment will continue for as long as the work performed is adequate. Although disclaimers are not, per se, a defense in Michigan, clear and unambiguous disclaimers characterizing those assurances as company policies that do not create contractual obligations can prevent an implied contract from taking effect (2).

If an employee’s dismissal does not comply with the law or does not comply with contractual agreements stated or implied in handbooks, application forms, or other company documents, it is considered a wrongful discharge. A wrongful discharge may be actionable in court. Even if a plaintiff does not prevail, management time and attorney costs are reasons to carefully review company policies before dismissal decisions, in particular when the dismissal is not based on a commonly accepted cause (see below). As a preventive measure employers need to review and regularly update their employment documents, if they want to ensure an at-will employment relationship with their employees. However, less job security may also result in less loyalty from the employees.

What are Grounds for Dismissal?

There are basically four generally accepted causes for dismissal: unsatisfactory performance, lack of qualifications for the job, changed requirements (or elimination) of the job, and misconduct (1). The failure to perform the assigned duties or to meet job standards can have a variety of causes, such as tardiness, absenteeism, or a negative attitude toward the company, other employees, or tasks assigned. In the case of lack of qualifications, the employee tries hard to do a good job but cannot. The employee should not have been hired in the first place, but considering the effort, this person may be retrained or reassigned. Similarly, if changes in a job make it difficult for the currently assigned person to perform, alternatives to dismal should be explored.

Deliberate and willful violations of company rules are called misconduct. A common form of misconduct is insubordination. Insubordination includes refusal to obey direct
orders by one’s supervisor, disregard of reasonable instructions, and deliberately ignoring company policies and procedures. Gross misconduct, which may lead to immediate termination, includes violence, especially when somebody is hurt, theft, and drug-related offenses. However, even when gross misconduct has occurred, it is typically better to suspend the offender and review what has happened than to terminate on the spot. Even in seemingly obvious cases, the employee has a right to a fair process and should have an opportunity to tell his or her side of the events.

**How to Go about Terminating an Employee**

Once the termination decision is final, the termination interview must be planned carefully, ahead of time. It is best to terminate in person, not by delivering a “pink slip” or over the phone. The location should be private, but non-threatening, e.g., a meeting room. If possible, security should be on stand-by. Because of the emotions involved in dismissals, unexpected incidents can happen. If the manager has any concerns, a second person present is a must.

The termination interview is not the time to have a friendly small talk or to discuss the prior good work of the employee. Briefly describe why the employee is let go; terminated employees who have been given the rationale for the decision are more likely to accept it. Emphasize the situation rather than the employee’s personality or shortcomings. Be explicit about the termination decision and make clear that it is final. Listen to what the employee has to say and give him or her time to calm down and be reasonable. Identify the next steps, such as clearing out the locker and how to receive the last pay check. Preferably, the pay check should be ready before the termination interview. Finally, in most cases, it will make sense to escort the terminated employee off the premises.

**Severance Pay**

Severance pay is a one-time payment or a salary continuation for a defined period after terminating an employee. Companies opt for severance pay for different reasons: as a reward for employees staying as long as they are needed, as a balance to expecting advance notice if an employee wants to quit, as a gesture of goodwill during layoffs signaling to the employees staying that they will be taken care of, and to deter disgruntled employees from filing a lawsuit against the company. Typically, employees are asked to sign a release form or a waiver before they receive any severance pay.

If an employer chooses to provide severance pay, a written policy should govern the process. It should be equitable and not a source of unfair differential treatment. When severance pay will be awarded, and when not, must be clearly defined. For example, if an employee is dismissed for cause or gross misconduct, will he or she still receive severance pay? Will payments continue if the employee starts working elsewhere? The employer should also reserve the right to change the severance pay policy.

Finally, the employer should also consider how to deal with potential unemployment benefit claims by a dismissed employee. For an employer who pays unemployment taxes, the contribution will increase if unemployment claims are charged to the farm. The unemployment statute disqualifies employees who were dismissed for misconduct from receiving unemployment benefits. Michigan’s Supreme Court defines misconduct as “carelessness or negligence of such degree or recurrence as ... to show an intentional or substantial disregard of the employer’s interests or of the employee’s duties and obligations to his employer” (3). In these cases, the employer can choose to let the Unemployment Insurance Agency know about the misconduct. However, employers often choose to allow their former employees to collect unemployment benefits, even if an employee was dismissed for misconduct.

**Additional Information**


Or consult Dr. Bitsch’s website at <http://www.msu.edu/user/bitsch> for information on this and other agricultural human resource management topics.

This article is based on human resource management books, articles, and other reliable sources. However, please remember that the article serves educational purposes only; it does not constitute legal advice.

An earlier version of this article first appeared in the Michigan State University Extension Crop Advisory Team Alert newsletters. Vol. 23, No. 18, September 19, 2008.
Processed Cheese: What is that Stuff Anyway?

There has been renewed interest in processed cheese due to the food industry’s need for tailor made cheeses with consistent quality and functionality as well as consumer needs for cheese products beyond natural cheeses. Processed cheese provides an opportunity to meet these needs. Today, processed cheese is one of the leading cheese varieties worldwide. This article explains the history of processed cheese and how these products are made.

Zey Ustunol
Dept. of Food Science and Human Nutrition

Processed cheese is made from natural cheeses that may vary in degree of sharpness of flavor. Natural cheeses are shredded and heated to a molten mass. The molten mass of protein, water and oil is emulsified during heating with suitable emulsifying salts to produce a stable oil-in-water emulsion. Depending on the desired end use, the melted mixture is then reformed and packaged into blocks, or as slices, or into tubs or jars. Processed cheeses typically cost less than natural cheeses; they have longer shelf-life, and provide for unlimited variety of products.

The literature on processed cheese until now has been somewhat limited because earlier research has been done in companies and held as trade secrets or were protected by United States patents. Today, almost all initial patents on processed cheese have expired providing opportunities for new developments. There has been renewed interest in processed cheese due to the food industry’s need for tailor made cheeses with consistent quality and functionality as well as consumer needs for cheese products beyond natural cheeses. Processed cheese provides an opportunity to meet these needs. Today processed cheese is one of the leading cheese varieties worldwide (1).

Some Historical Background

Although somewhat uncertain, the origins of processed cheese are thought to date back to Swiss cheese fondue, German Kochkase (cooked cheese), French Cancoillotte or Canquillotte and Welsh Rarebit. Kochkase and Cancoillotte were made with coagulated sour milk or skimmed milk; Fondu was made from Swiss cheese, which is a rennet cheese. Soda was added in the preparation of Kochkase, and eggs were used to make Cancoillotte. Wine and/or beer were used to prepare Fondu.

Commercially, the first processed cheese was developed by Walter Gerber and Fritz Stettler in Switzerland in 1911. In this process, natural Emmentaler cheese was shredded and heated with sodium citrate to produce a homogenous product which firmed up upon cooling. The initial intent of this product was to improve shelf-life of cheese shipped to warmer climates. About this time, James Lewis Kraft in the United States of America (USA) was working independently on blending and heating of natural cheeses. The first patent, which was issued to him in 1916, describes melting pieces of Cheddar cheese and stirring it while heating to form a homogenous warm cheese which was then packaged in glass jars or cans (2). This first patent did not describe addition of emulsifying salts and/or other ingredients during processing. The use of emulsifying salts (sodium phosphate) was described later for the first time in 1921 in a patent issued to George Herbert Garstin of the Phoenix Cheese Company (3).

In another patent issued to Kraft in 1921, packaging of a 2.27 kg loaf was described, which was a significant breakthrough for the distribution of process cheese (4). It is believed that the 2.3 kg loaf was responsible for nearly doubling of processed cheese consumption in the USA during this time period. Later, several other patents were issued that described processing and packaging methods and equipment. In 1927, Wheeler & Scott were issued a patent in which they describe a lay-down cooker that claimed for rapid and uniform heating of the cheese during manufacturing (5). This equipment later evolved to the jacketed kettle and, in 1935, Norman Kraft was issued a patent for a lay down cooker that provided for heating the cheese by direct injection of steam into the product (6). However, direct injection of steam for cooking incorporated added moisture, which then needed additional monitoring to assure that the cheese did not exceed its legal moisture limits.

Over the years, other gradual improvements included modifications to the cookers for improved and more uniform heating, and changes to mixing configurations for more uniform mixing of the ingredients and enhanced emulsification. Improvements to the process control resulted in more uniform quality product. During this time, there was also a concurrent development in the manufacture of cheese slices and other convenient forms of processed cheese and related products. In the 1940s and early 1950s, methods and equipment for continuous forming of processed cheese slices were developed. Norman Kraft filed a patent in 1940, which was issued in 1944 that described the production of processed cheese slices. In this...
process, hot processed cheese was transferred onto a pair of cooling drum rolls. The thin sheet of cheese that was produced was then transferred onto a conveyor where it was cut into ribbons and then cross cut again to form the processed cheese slices (7). These cheese slices were flexible, and had a glossy smooth finish. The process prevented the slices from sticking together as well as sealing in the flavour of freshly produced cheese. This was a significant breakthrough in terms of convenience, replacing the cheese loaf as the major type available to consumers. At present, processed cheese slices account for 74% of total sales at the supermarket in the USA (8).

By the 1950s, several other procedures were developed to fill the demand for sliced cheese. The most significant one was the invention of the individually wrapped slices. Other developments included type and quality of the ingredients used for processed cheese manufacturing. In 1950, standards of identity for processed cheese were established by the United States Food and Drug Administration (FDA). At this time, it was also required that the optional ingredients be declared on the label. In 1974, enzyme modified cheeses (EMC) were approved as optional ingredients for the manufacture of processed cheese. EMC provided for accelerated ripening of natural cheeses to enhance flavor levels in processed cheese. They reduced costs associated with storage, and investment of natural cheese inventory. They also provided specific flavors, flavor intensities and uniformity to meet specific processing needs. In 1973, standards of identity for cheese analogues and imitation cheeses were established by FDA (9).

Processed Cheese and Products

Standards of identity define the product, its composition, and the types and levels of ingredients allowed, for processed cheese products and analogues and vary depending on the country. In the USA, they are found in the Code of Federal Regulations (CFR) Title 21 (10). There are also International Codex Alimentarius Standards for processed cheese varieties. In the USA, three main categories of processed cheese and products are defined. The box to the right summarizes the characteristics of these different categories of processed cheese and related products. They differ based on requirement of minimum fat content, maximum moisture content minimal final pH, and optional ingredients that can be used. ‘Pasteurized Process Cheese’ is a dairy product that is produced by mixing and heating of natural cheeses with emulsifying salts to produce a homogeneous plastic mass. This product is cooked typically at about 70-80°C. The final product has the same fat content and not more than 1 % greater maximum moisture content than the corresponding natural cheese. A good processed cheese is smooth and uniform in color, melts uniformly, slices smoothly and has a compact body. ‘Pasteurized Process Cheese Food’ has the same specifications and ingredients as Pasteurized Process Cheese, but the product contains more moisture, less fat, lower pH and the cooking temperatures are higher. The standard of identity also allows for optional ingredients, which are not permitted in ‘Pasteurized Process Cheese’. The final product is softer in body and milder in flavor than processed cheese. Cooking temperatures for this product are around 82°C and organic acids, such as citric, lactic, acetic, phosphoric, are added to decrease the pH level in the product. The final pH of processed cheese should range from 5.2-5.6 (11). ‘Process Cheese Spread’ is manufactured similar to processed cheese and processed cheese food; however, the incorporation of excess moisture is permitted for better spreadability of the product. This product is cooked to about 88°C and organic acids are used to acidify the product during processing. The same optional ingredients as processed cheese food are allowed. In addition, sweetening agents, starches, and gums/hydrocolloids at a maximum level of 0.8g/100g of the finished product may be used (11). Gums/hydrocolloids provide for additional water binding for this higher moisture product. There are also a variety of additional products and

Standards of identity for pasteurized process cheese and products (FDA, 2006)

### Pasteurized process cheese

Ingredients: Contains natural cheeses or enzyme modified cheeses, emulsifying agents (<3 % w/w), acidulants (vinegar, lactic acid, citric acid, acetic acid, phosphoric acid), milkfat (from cream, anhydrous milkfat or dehydrated cream; <5% w/w), water, salt, colors, spices, flavorings, mold inhibitors<sup>1</sup> (sorbic acid, potassium sorbate, sodium sorbate; <0.3% w/w), antisticking agent<sup>1</sup> (lecithin <0.03% w/w). Moisture: <40 % (w/w); Fat: > 30 % (w/w); pH: >5.3

### Pasteurized process cheese food

Ingredients: Natural cheeses and enzyme modified cheeses (>51% (w/w) of the final products) all of the ingredients allowed in processed cheese, also milk, skim milk, buttermilk and cheese whey. Moisture: <44 % (w/w); Fat: > 23 % (w/w); pH: > 5.0

### Pasteurized process cheese spread

Ingredients: Natural cheeses and enzyme modified cheeses (>51% w/w of the final products) all of the ingredients allowed in processed cheese food, also food gums, sweeteners, nisin (<250 ppm). Moisture: 44 – 60 % (w/w); Fat: > 20 % (w/w); pH: > 4.0

<sup>1</sup>Slices, or cut in consumer-sized packages
University and Industry

Over $100,000 in Scholarships Awarded to Dairy Students

Miriam Weber Nielsen
Dept. of Animal Science

The Michigan Dairy Memorial and Scholarship Foundation continues to be the largest scholarship program in the College of Agriculture and Natural Resources. Now in its 52nd year, it has grown to a principal account of over $700,000 primarily through gifts from individuals and organizations in the Michigan dairy industry, many of whom have contributed to honor a dairy industry leader as an Honoree of the Foundation. New Honorees this year include Wayne Wood, Dr. Herb Bucholtz, Nelson Sperry and Dr. Kirk Heinze.

The Foundation awarded nearly $100,000 in scholarships this year. Scholarships are awarded on the basis of academics, extracurricular involvement, and interest in a career in the dairy industry.

Glenn and Anne Lake Scholarship

The Glenn and Anne Lake Scholarship covers all tuition and fees for an academic year. This year’s recipient is Ashley Messing, daughter of Gregory and Shelly Messing. A senior in Animal Science from Bad Axe, Ashley grew up on a dairy farm and started showing dairy animals at a young age. She served as Michigan’s Dairy Ambassador, and participated in the MSU Dairy Club, National Agri-Marketing Association, dairy judging, Block and Bridle and Collegiate Farm Bureau. She participated in the MSU and Midwest Dairy Challenge events, and was part of MSU’s 1st place Platinum team in the 2008 National Dairy Challenge. After graduation she plans to work in the nutrition or AI industry.

Russel Erickson Scholarship

The Russel Erickson Scholarship of $5,000 is awarded to Greta Koebel. Greta, a senior in Agribusiness Management from Three Oaks, is the daughter of Terry and Jennie Koebel. She began showing cows when she was five, and has been very active in the dairy industry, receiving state and national awards for her involvement. She has been active in the MSU Dairy Club and Collegiate Farm Bureau. Greta plans to continue farming with her family after graduation and to work in the dairy genetics industry.

Donald and Valera Murray Scholarship

The Donald and Valera Murray Scholarship of $4,000 is awarded to Lindsey First. Lindsey is a senior in Animal Science from Ionia, and is the daughter of Dan and Margie First. Her experience on her family’s dairy farm led to her interest in a career in dairy reproduction after graduation. Lindsey has been active in the MSU Dairy Club, dairy judging, the MSU and Midwest Dairy Challenge events, and received her American FFA degree in 2006. Lindsey will represent MSU on the 2009 National Dairy Challenge team.

Jack & Betty Barnes International Michigan Dairy Memorial Endowed Scholarship ($1,000)

The Barnes scholarship is provided through an endowment from Jack and Betty Barnes and is given annually to a student interested in a dairy industry career who is participating in an international experience to enhance his or her education. This year’s recipient was Gail Carpenter, a senior in Animal Science. Gail traveled to Europe with the dairy cattle judging teams in summer 2008. As a daughter of two teachers, she has always enjoyed sharing her passions with others. Her dedication to agriculture and the dairy industry is leading her to pursue a Master’s Degree in dairy nutrition upon graduation. She would like to find a career where she can apply her knowledge of dairy science on a practical farm level. Gail is the daughter of Dan and Sandy Carpenter of Dansville.

Howard Cowles Dairy Scholarships

The Howard Cowles Dairy Scholarships are given annually to students in Animal Science who have attained junior status and demonstrated a strong interest in dairy. Academic achievement and participation in extracurricular dairy activities such as the MSU Dairy Club, Dairy Challenge, Dairy Associates Program or MSU Dairy Judging are given strong consideration. The scholarships are provided by revenue from a gift from the estate of Howard E. Cowles, who was a long-time employee of Sealtest Dairy. This year’s recipients of $1,400 scholarships were Gail Carpenter and Ashley Messing.

Michigan Dairy Memorial Freshman Scholarships ($1,500)

The following students received Michigan Dairy Memorial Freshman Scholarships ($1,500): Sarah Bartley-Mann, Camden, Animal Science; Brandon Gingrich, LeRoy, Animal Science; Ashley Orlowski, Saranac, Agribusiness Management; Eric Sneller, Sebewaing, Animal Science; William Stinson, Kinde, Dairy Management; Lisa Vander Veen, Grand Haven, Dairy Management.

Michigan Dairy Memorial Ag Tech Scholarships ($2,000)

The following students received Michigan Dairy Memorial Ag Tech Scholarships ($2,000): Eric Cole, Bancroft, Dairy Management; William Huisjen, Fremont, Dairy Management;
Josh First, Ionia, Dairy Management; Matthew Spitzley, Pewamo, Dairy Management; Nathan Southwell, St. Johns, Dairy Management; Eric Westendorp, Nashville, Dairy Management.

Michigan Dairy Memorial Scholarships ($3,500)

The following students received Michigan Dairy Memorial Scholarships ($3,500): Krista Beeker, Constantine, Animal Science; Melissa Brower, Jamestown, Animal Science; Gail Carpenter, Dansville, Animal Science; Jessica Fry, Blanchard, Animal Science; Karmen Jackson, Caro, Animal Science; Angelee Musser, Kingsley, Animal Science; Joseph Pasch, Weidman, Animal Science; Andrew Rupprecht, Vassar, Agribusiness Management; Nicole Schaendorf, Allegan, Ag. and Natural Resources Communications; Autumn Sieffert, Grawn, Animal Science; Lynnae Slavik, Ashley, Animal Science; Kayla Stomack, Minden City, Animal Science; Katelyn Thompson, Charlotte, Animal Science; Hannah Tucker, Elsie, Animal Science; Laura Zeldenrust, Fremont, Animal Science.

For information on making contributions to honor members of the dairy industry or to support student scholarships, please contact College of Agriculture and Natural Resources External Relations at (517) 355-0284. To learn more about the Michigan Dairy Memorial and Scholarship Foundation, contact Dr. Miriam Weber Nielsen in the Department of Animal Science (517-432-5443; msw@msu.edu).

Message from the Animal Agriculture Initiative Director

Research to Reality: Science Impacts Lives

By Michael Orth
Dept. of Animal Science

The Animal Agriculture Initiative, or AAI, was introduced into law by the state in 1993 as the Revitalization of Animal Agriculture in Michigan Initiative. In today’s troubled economy, the original mission of the AAI echoes even more loudly. The grass-roots partnership between livestock producers, industry groups, MSU and the Michigan Department of Agriculture was heralded as an economic development opportunity, a drive to diversify the state’s economy away from and lessen its dependence on the automobile industry. The AAI can be a conduit to developing more profitable and sustainable farm production practices, environmentally sound manure management systems, efficient new energy sources, safer food products and more humane animal care systems based on science.

The AAI brought state-of-the-art facilities, expert faculty members, the opportunity to conduct cutting-edge research at MSU, and the promise to make an important contribution to Michigan’s agricultural industries and the state’s citizens. An economic survey commissioned by the AAI in 2007 revealed that nearly $22.9 million in annual economic activity can be linked back to the initiative. If you want to learn more, visit the AAI Web site (www.animalag.msu.edu) to view the entire report.

AAI-funded research adds $11.5 million annually to the state’s economy, and the MSU Pavilion alone infuses more than $5 million every year into the local economy. The AAI can also be proud of providing recurring support for 780 jobs with annual wages of $19.6 million. Findings and recommendations derived through AAI-funded research provide $4 million in direct support every year to the state’s livestock industry, and for every state tax dollar invested in the AAI, the initiative returns $3.40 in gross state product.

The AAI makes an important contribution to Michigan—the AAI enriches lives.

Michael Orth
Michigan Milk Market Update

Christopher Wolf
Dept. of Agricultural, Food, and Resource Economics

Reviewing the financial analysis from the MSU Dairy Farm Business Analysis summary for the past eight years—noting that 2008 values are preliminary at this time—reveals that feed costs were the big story in 2008. Even though the milk price seemed healthy at $19.49/cwt, a dramatic increase in feed cost meant that the income over feed cost was only $6.75/cwt. That was the value left to cover all other costs and generate a profit.

The news that Cooperatives Working Together is accepting bids for the seventh herd buyout from April 1 to May 1 comes as little surprise given the program’s desire to help take the troughs out of milk price variation. There is little doubt that there is no money to be made at current milk and feed prices. As Figure 1 reveals the milk-to-feed price ratio has been consistently below 2.0 since the Spring of 2008. The average ratio from 1985 to the present time is the solid line at 2.86. The last time the ratio was above that average was November 2007. The February and March 2009 values of 1.5 are the lowest values recorded since USDA began tracking these values in 1985.

Jim Hilker here at MSU updates the probabilistic price forecasts using futures and options data weekly. He tracks corn, soybeans, wheat, cattle, hogs and milk (available at his web site: https://www.msu.edu/~hilker/). As of April 2, which follows the latest CWT announcement of a buyout but with the size not known, the September Class III milk futures closed at $14.77/cwt. Using the options market prices, we can estimate that there is a 50% chance the Class III price will be less than (or equal to) $14.77 and a 50% chance that the price will be

![Figure 1. US Milk-to-Feed Price Ratio, January 2006-March 2009](image)

Table 1. MSU Dairy Farm Summary Values, 2001-2008.

<table>
<thead>
<tr>
<th>Year</th>
<th>ROA (percent)</th>
<th>Milk Price ($/cwt)</th>
<th>Purchased Feed ($/cwt)</th>
<th>Total Feed Cost</th>
<th>Income Over Feed Costs ($/cwt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>7.6</td>
<td>15.23</td>
<td>3.95</td>
<td>6.75</td>
<td>8.48</td>
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<td>2002</td>
<td>3.2</td>
<td>12.47</td>
<td>3.45</td>
<td>7.01</td>
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<tr>
<td>2003</td>
<td>4.3</td>
<td>12.59</td>
<td>3.56</td>
<td>7.18</td>
<td>5.41</td>
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<tr>
<td>2004</td>
<td>7.7</td>
<td>16.42</td>
<td>4.36</td>
<td>7.47</td>
<td>8.95</td>
</tr>
<tr>
<td>2005</td>
<td>6.3</td>
<td>15.70</td>
<td>4.06</td>
<td>8.14</td>
<td>7.56</td>
</tr>
<tr>
<td>2006</td>
<td>5.5</td>
<td>13.44</td>
<td>3.74</td>
<td>8.29</td>
<td>5.15</td>
</tr>
<tr>
<td>2007</td>
<td>11.3</td>
<td>20.21</td>
<td>5.32</td>
<td>9.55</td>
<td>10.66</td>
</tr>
<tr>
<td>2008</td>
<td>6.2</td>
<td>19.49</td>
<td>5.62</td>
<td>12.74</td>
<td>6.75</td>
</tr>
</tbody>
</table>

^aPreliminary MSU values.
^bROA = rate of return on assets at market value.
^cEstimated using USDA values ($/cwt).
greater than (or equal to) $14.77 (Figure 2). At that time the market was indicating that there is a 10% chance that the price will be higher than $18.46/cwt and a 10% chance that the price will be less than or equal to $11.84/cwt. With respect to corn July and December were around $4/bushel and soybeans were between $8.80 and $9.60/bushel. The estimated milk-to-feed price ration would be about 2.2 based on these grain prices, an alfalfa hay price of $135/ton (average over past 4 years) and typical Michigan bases on milk and grain. That is hardly an ideal profit situation for dairy farmers.

More Information
More on milk market trends and developments can be found at the MSU Extension Dairy Team web site at <http://www.dairyteam.msu.edu>.

**Figure 2.** Milk price cumulative distribution function, April 2 2009.

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**Calendar of Events**

**April - July**

- **MMPA & 4-H Milk Marketing Tour**
  June 17-18
  Novi
  Contact: 248-474-6672

- **2009 American Forage and Grassland Council Annual Conference**
  June 21-24
  The Amway Grand Plaza Hotel
  Grand Rapids
  Contact: 800-944-2342, info@afgc.org

- **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
  Contact: <http://www.agexpo.msu.edu>

- **Forage Demonstration Day**
  July 25
  MSU Experiment Station
  Lake City
  Contact: Janice Rumph, 231-839-3001 or Dave Stroud 231-839-4667
Michigan Biosecurity STOP Sign Campaign to START

Ted Ferris
Dept. of Animal Science

Dan Grooms
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Beginning in April, Michigan State University Extension will begin a project to work with dairy and beef operations to demonstrate farm gate biosecurity protocols. The project is intended to create awareness of the importance of biosecurity and farm security. A research component of this project will attempt to identify why dairy and beef producers do and don’t adopt farm gate biosecurity and security practices. Biosecurity protocols being considered include posting a driveway STOP Sign (to be provided) requesting visitors to see management before entering animal facilities, creating one entry drive with a closeable gate, a designated visitor parking area to help control farm traffic, a boot disinfecting station with a plastic boot dispenser and a place for a daily sign-in log sheet for visitors. Participants will be provided with written materials and training/instructions to implement these protocols. These protocols will reduce risk to disease introduction and aid in farm security.

The project is being funded jointly by the United States Department of Agriculture, Michigan Department of Agriculture and Michigan State University Animal Industry Coalition. It is part of the Be Aware Be Prepared animal industry effort that involves a number of animal industry groups including Michigan Milk Producers Association, MSU, Michigan Farm Bureau, Dairy Farmers of America, Michigan Pork Producers Association, Michigan Cattlemen’s Association, and Michigan Department of Agriculture. The demonstration project may involve 100-200 dairy farms and 50-100 beef producers who will be asked to voluntarily participate. The ultimate goal of this important project is to help further ensure the health and welfare of Michigan’s dairy and cattle industry by increasing awareness and adoption of farm gate biosecurity protocols.

For more information, contact Dr. Ted Ferris at 517-355-8442 (ferris@msu.edu) or Dr. Dan Grooms at 517-432-1494 (groomsd@cvm.msu.edu).

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low-fat versions of the above products that do not fit into the above standardized categories. ‘Pasteurized Process Cheese Product’ is an undefined category for products that do not meet the standards of identity as defined in the CFR. In the ‘Pasteurized Process Cheese Product’ category there are no limits on the fat and moisture content. This allows for different and innovative milk derived ingredients, and provides more readily for new product development opportunities. Additional ingredients included in the above products include vegetables, meats, fruits, herbs, flavors, colors and spices.

The market share of these products in the USA in 2007 is as follows:- (a) 74% of processed cheese is sold as slices, (b) 20 % as loaves of various sizes, (c) 4.5% as spreads and (d) the remaining 1.5 % as cubed, shredded and grated (IDFA, 2007).

So, next time you would like a cheese that melts uniformly for cheese sauce and over nachos or a cheese slice that makes for a juicy cheeseburger, do consider blocks, or singles of pasteurized processed cheese products, respectively!!

References

Tips for Spring Fertility Management in Forages

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Richard Leep
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Spring can be one of the busiest and most important seasons in terms of determining this year’s plans for sustainable and profitable production. Due to increasing fertilizer prices, it is important to make plans on how to utilize fertilizer or animal manure in forage production. The best use of manure nutrients is on crops with a high nitrogen requirement, such as corn or sugar beets. If land base is limited for manure on the farm, or hay and pasture ground are in need of the nutrients, then manure may go to grass and alfalfa fields. Following are some tips for spring fertility management for both hay and pasture.

1. Prioritize the field. Since forage fields are variable in terms of soil fertility, it is important to prioritize the fields to be fertilized from chemical fertilizer or animal manure. It would be an economic loss if expensive fertilizers are placed on low productive fields such as old stands, weedy fields, and/or low soil pH fields. Prioritizing the fertilization onto the field should be based on soil test, forage yield potential, stand health, and field uses.

2. Soil sample for soil nutrient analyses. If chemical fertilizers or animal manure are being placed on hay or pasture fields without knowing the soil nutrient levels, this may increase production cost and environmental impacts. Fertilizer or manure should be applied based on soil test results. Macro- and micro-nutrients would not be utilized properly by forage plants if soil pH is not in optimal range for forages (pH 6.0 – 7.0), particularly for alfalfa (required pH is 6.5 – 7.0). Further information on soil sampling and analyses is available at http://www.css.msu.edu/SPNL-Sampling.cfm

3. Apply fertilizer or manure in split. Since spring growth can be almost two-thirds of the whole year’s production, it is optimal to fertilize the nitrogen to the needs of the grasses for both hay and pastures ranging from 40 to 50 lb N/acre at green-up. As a rule of thumb, if the vegetation in the field is more than 50% legumes, no nitrogen is required. One of the mistakes in fertilizing forages in spring time is that some producers put the whole year’s nitrogen rate on in spring rather than doing split applications. One, larger application is vulnerable to losing large amounts of nitrogen through volatilization, surface runoff, leaching and/or denitrification (nitrogen losses in anaerobic condition such as very wet or standing water conditions).

4. Utilize animal manure efficiently. It can not be emphasized enough how important it is to know the value of manure and utilize it efficiently for forage production. Dairy manure has both macro- and micro-nutrients so that if it is utilized properly, farmers can not only save chemical fertilizer costs but also build soil quality. Applying dairy manure should be based on soil and manure analyses. Avoid manure applications to forage stands that are wet to decrease the risk of smothering plants or causing plant diseases. Ideally, manure is best utilized on non-legume forages such as corn or grasses. Legume plants such as alfalfa, red clover and white clover, however, can utilize nitrogen from two sources and there is a mutual relationship happening between nitrogen fixation and manure nitrogen. If dairy manure is applied to alfalfa fields, alfalfa prefers to utilize the free nitrogen from manure first and then fixes its own nitrogen. Therefore, applying dairy manure to alfalfa is an option to increase the acreage of manure application if the corn acres do not provide sufficient land base. Apply dairy manure to older and poorer alfalfa stands, or lower fertility alfalfa fields first if possible. Do not apply more than 3,000 – 5,000 gallons of liquid or about 10 tons of solid dairy manure per acre in a single application.

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