More Studies Highlight Health Benefits of Consuming Milk and Dairy Products

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Introduction

Milk and dairy products have been recognized as important foods for humans since 4,000 B.C. when Egyptian hieroglyphics were first used and when many now-common farm animals were first domesticated, including cows. The dairy sector has made continuous advancement over the years and today a wide variety of milk/dairy products are readily available to consumers. These products are an important source of key nutrients including high quality protein, energy, and many essential minerals and vitamins, although the nutritional importance of dairy fats is often less well understood. In response to considerable scientific research on the nutritional value of milk, dietary guidelines around the world have recommended daily consumption of dairy products for the overall health of the population.

Unfortunately, for over half a century, the concept of eating healthy has become synonymous with avoiding dietary fat and cholesterol, especially saturated fat. On a population basis, this has resulted in a diet low in saturated fat being at the core of nutritional advice in many countries for lowering plasma cholesterol and reducing heart disease risk. In the case of dairy products, there has been a general perception that a food containing saturated fat is unlikely to be beneficial to health. Recent estimates indicate that approximately 30% of our dietary intake of saturated fat comes from dairy products with cheese being the major source. However, over the last decade, evidence has accumulated that the composition and quantities of dietary fat is very important in determining the relative risk to diseases such as heart disease and cancer, and that milk-derived fat may offer significant health benefits compared with some common sources of dietary fats. It is important to recognize that individuals consuming dairy fats do not just consume saturated fat, but rather the fats in the whole dairy food are highly complex and may contain beneficial ingredients.

Challenge to Old Assumptions

The appropriateness of recommendations regarding the intake of dairy products (particularly in relation to reducing saturated fat intake by reducing dairy consumption) has been challenged by conclusions from a number of recent meta-analysis and data summaries. Peter Elwood and colleagues (Cardiff University, UK) published two reviews (2008: http://www.ncbi.nlm.nih.gov/pubmed/19155432; and 2010: http://www.ncbi.nlm.nih.gov/pubmed/20397059) that examined associations between milk/dairy products and health and survival. The long-term effects of milk and dairy product consumption on health would ideally be tested.
in dietary intervention studies with disease/death events as the key outcomes. This is of course problematical, and thus far, no adequate studies of this type have been reported. As a result, Elwood and colleagues concluded that the most valuable evidence on associations between milk/dairy products and health and survival would be provided by long term observational (epidemiology) studies. These avoid the weaknesses of studies using markers of risk such as plasma cholesterol.

Elwood et al (2008) combined the results of several studies (often referred to as meta-analysis) that examined the associations between milk/dairy products and health and survival. This showed convincing evidence that a greater intake of milk can provide long-term reductions in the risk of heart disease. The relative risk (RR) of stroke and heart disease in subjects with high milk/dairy consumption 0.79 and 0.84, respectively, relative to the risk in those with low consumption (RR = 1.0, Figure 1). This means that subjects with high milk or dairy consumption had a 21 and 16% reduction in risk of developing stroke and heart disease compared with subjects with low dairy foods consumption.

This work has been extended to examine the evidence for differential effects of milk, cheese, and butter on incidence of vascular disease (Elwood et al 2010). It found that there were very few cohort studies available for cheese (5) and butter (6). For butter only 3 studies were suitable for meta-analysis yielding a non-significant RR for high vs. low consumption (0.93). For cheese, only 2 studies were suitable for meta-analysis. There are few actual scientific studies that have adequately compared the effects of full fat milk with fat reduced milk.

The results of Elwood and co-workers provide the best evidence available that those who consume large quantities of milk are at no greater risk of heart disease than those who consume little. Indeed, there appears to be a small but valuable reduction in risk of heart disease from increased consumption. As noted earlier, the evidence for cheese and butter is inconclusive. These findings are in broad agreement with the recently reported outcome of a remarkable 61-year follow up of the Boyd-Orr cohort study. This study involved the recruitment of 4,999 children in England and Scotland in 1937-39 with causes of death recorded from 1948. This study showed that a family diet in childhood, which was high in dairy products, did not give rise to a greater risk of heart disease.
disease or stroke mortality. Indeed all-cause mortality was lowest in those with the highest dairy/milk intake.

These findings are therefore suggestive that despite milk fat being rich in saturated fat, milk at least has other properties that are beneficial in respect to heart disease risk. With respect to ‘reduced-fat’ dairy products, there are studies that report disease rates in subjects who consume ‘regular-fat’ dairy foods, and in those who consume reduced-fat dairy foods. However, the data are hopelessly confounded due to the adoption of other health-related behaviors by subjects consuming low-fat milk. The appropriate question to ask therefore is: do fat-reduced milk/dairy foods provide any additional advantage to human health, or does the reduction in fat reduce the benefits of whole milk and dairy products?

**Conclusion**

Overall, the available evidence does not support the idea that consumption of dairy products increases the risk of heart disease. In fact, linking the benefits of milk consumption with deaths from key chronic diseases (including heart disease) led Elwood and colleagues to conclude that “high milk consumers probably have an overall survival advantage”. It is unfortunate that due to a focus on the small rise in blood cholesterol with milk drinking, the debate on milk has never achieved a reasonable balance in the evaluation of risks and benefits. Clearly, broad generalizations about fats can be misleading and often inaccurate.

There are several bioactive components found in milk fat, milk proteins, and other components that have potential benefits for health maintenance and the reduction of chronic disease risk, and this reinforces the need for the dietetic community to reconsider current recommendations on dairy products and human health. Continued recommendations to reduce milk fat intake may result in inadequate intakes of key nutrients in certain population groups.

We recently developed a series of informational posters on this subject. Contact the author for additional information on the scientific evidence related to the impact of dairy product consumption and milk fat in human diets on human health (517-353-8714 or Email, allock@msu.edu).
Organic Milk: Is it Really Worth the Price?

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Introduction
Some consumers are willing to pay a significantly greater price for organic milk because they believe it to be superior to conventional milk. However, there are very few scientifically sound studies to illustrate differences in nutritional quality or value of organic versus conventional milk, and there is little or no scientific research examining possible differences in sensory attributes of the two types of milk.

Recent studies surveyed retail milk to compare nutrient compositional differences of processed milk purchased by the consumers. Studies found greater concentrations of protein (Vicini et al., 2008), polyunsaturated and conjugated linoleic acids (CLA) (Butler et al., 2011) in retail organic milk compared with conventional retail milk, and differences in fatty acid profiles (Butler et al., 2008, 2009, 2011; Ellis et al., 2006) of milks from different production systems. Additionally, folate (an important B vitamin in pregnancy) concentrations were less in organic milk due to the greater frequency of ultra-high temperature (UHT) in the processing of organic milk (Forssen et al., 2000). This article provides a summary of the current scientific knowledge on the nutritional aspects and sensory attributes of organic milk compared with conventional milk.

Some Background
Milk is an important part of the US diet as well as for those around the world. All throughout history milk has had a wholesome and a ‘natural’ image, and the U.S. standards of identity for dairy products (FDA 2006) have maintained this image. Milk and dairy foods are a good source of high quality protein; vitamins A, D, riboflavin and folate; and minerals: calcium, phosphorus, magnesium and potassium (Miller et al. 2007). Furthermore, there is increasing scientific information that shows the importance of dairy foods in bone health (Miller et al. 2007), weight management (Miller et al., 2007; Snijder et al., 2007), managing Type 2 diabetes (Choi et al., 2005), and high blood pressure (Steffen et al., 2005).

A fairly new niche in the dairy case at the grocery store is organic milk, as well as organic dairy foods produced from organic milk. Organic milk is produced on organic dairy farms according to the USDA organic practices. Organic milk typically sells $1.0 - 4.0/gal more than conventional milk at the grocery store (Vicini et al., 2008). Consumers that purchase organic milk are willing to pay this significantly greater price because they believe organic milk to be superior to conventional milk. Unscientific consumer surveys have reported organic milk to be more nutritious, taste better (creamier), ‘free’ of hormones and antibiotics, and have a longer shelf life due to its higher quality. However, most consumers have very little knowledge of how milk is produced, processed and distributed to retail stores (Vicini et al., 2008).

Over the years, organic milk labeling and claims have been controversial in that milk processors making label claims that describe management of the cows (which include grazing of animals on pasture, non-use of rbST, or antibiotics) imply that this milk is better and more nutritious. In fact, there are few scientifically sound studies that show significant differences in nutritional quality of organic and conventional milk. As far as I know, there are no scientific studies done on differences in their sensory attributes taste, texture, etc).

Earlier studies have shown that fatty acid profiles of milk from cows under organic management differ from those from conventional farms (Bergamo et al., 2003; Kraft et al 2003; Ellis et al., 2006; Butler et al., 2008, 2009). However, published results are inconsistent, sometimes contradictory, and with few differences reported for milk collected in the winter. Furthermore, these results have been obtained from milk harvested on farms and do not adequately represent the milk.
purchased by the consumers, which has undergone processing. More recent studies have surveyed retail milk to compare compositional differences. Vicini et al. (2008) reported minor differences in composition between organic and conventional milk; macronutrients (e.g., fat and protein) were similar except slightly greater protein in organic milk.

Conventional milk had lower microbial counts, but the researchers indicated that these differences were not biologically meaningful. In addition, conventional milk had significantly less estradiol and progesterone levels than organic milk. Whereas, concentrations of IGF-1 were lower in organic milk compared with conventional milk. These authors did not report on differences in micronutrients. Folate concentrations in milk have received much attention recently due to new data on folate’s important role in preventing child birth defects. As a result, recommended dietary allowances (RDA) for folate, specifically for pregnant women, were revised (Bailey, 2000).

On average, milk and dairy products provide 10 to 15% daily folate intake in many Western countries. However, folate concentrations have been reported significantly lower in organic milk due to routine ultra-high temperature (UHT) processing of organic milk (Forssen et al., 2000).

Butler et al. (2011) reported on fat composition of organic and conventional retail milk in northeast England. They surveyed 22 brands over a 2-year period and reported significant differences in fatty acid profiles with organic milk having greater concentrations of total polyunsaturated and conjugated linoleic acid cis-9, trans-11 and alpha-linolenic acid. Both of these fatty acids have been linked to positive health effects (Huang et al., 2007; Wahle et al., 2004; Bhattarchya et al., 2006). These differences were influenced by season and the year of the study.

None of the studies by Vicini et al (2008), Forssen et al. (2000), and Butler et al (2011), which are surveys of retail milk, provides information about the animals, management practices at the farm level, quality of the raw milk and processing conditions.

These results are further confounded by organic milk typically being ultra-high temperature (UHT) pasteurized whereas conventional milk is high temperature short-time (HTST) pasteurized. Although processors are required to pasteurize their product, they are not required to disclose method of pasteurization on their label. Due to the higher temperatures used, the UHT process provides milk with a longer shelf life regardless of the milk source. In the case of organic milk this longer shelf life is perceived to be higher quality milk by the consumer. In reality, it is most likely due to higher pasteurization temperature. Comprehensive, well-designed, scientifically sound studies that compare organic milk with conventional milk by tracking milk production from comparable farms, processed under similar conditions, and handled similarly until it reaches the consumer, are needed. The effect of animal nutrition on milk composition particularly fat composition is well documented (Jensen, 2002; Walker et al., 2004) and manipulating the diet of the animal can alter nutritional, particularly the fatty acid, profiles in milk. Metabolic processes determining nutrient and fatty acid profiles, however, are still not totally predictable. Thus in valid scientific studies, it is important to compare milk from comparable farms that are delivered and processed under similar conditions. If significant differences showing positive attributes for organic milk are demonstrated by scientifically-sound studies, labeling claims and higher prices for organic milk at the grocery store will be justified.

Until then, is organic milk really worth the greater price at the grocery store? Ok, I’ll let you answer that. You can email your answers to me at ustunol@anr.msu.edu. Your valuable perspectives can help guide our assessment of this important topic of dairy foods. 

“On average milk and dairy products provide 10 to 15% daily folate intake in many Western countries. However, folate concentrations have been reported to be significantly lower in organic milk due to typically ultra-high temperature (UHT) processing of organic milk.”
Can You Use Alternative Feed Ingredients to Replace Corn Grain?

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Dairy Nutrition

Introduction
Feed is the single largest expense in dairy farms. Corn grain is fed to dairy cows oftentimes because of its high energy and starch contents. With high corn prices in 2011, dairy producers may be seeking alternative feeds to lower feeding costs. Because of the high energy requirements of lactating dairy cows, feed selection must include considerations of energy content and digestibility while maintaining a healthy rumen environment. Lactating dairy cows typically consume a nutrient dense ration with approximately 50% forage and 50% concentrate.

Sources of Energy
Digestible starch, fiber, sugar, and fat supply most of the energy in the ration, but ultimately cows need a certain amount of digestible starch to maximize milk lactose secretion and lactation performance. The most common source of starch in Michigan dairy rations is corn grain. The amount of starch in the ration can vary between 15 to 30% of the dietary dry matter depending on the level of milk production, stage of lactation, and animal health.

Alternative Feed Categories
When corn price is high, can other feeds substitute for corn in the ration? Alternative feeds may be available at competitive prices, but they need to be carefully evaluated as to how they might fit into the ration. It is important to decide which nutrient(s) you are seeking to replace when using alternative feeds. For example, if corn grain is to be replaced by an alternative feed ingredient, then some of the original starch will need to be replaced by the alternative feed. Alternative feedstuffs generally can be classified into several categories - fillers, starch, digestible fiber, protein, protein/fiber, and fiber/protein/fat.

- Fillers - these feeds have low nutritional value for dairy cows and would be used in situations of fiber or feed shortage. Examples are rice hulls and cottonseed hulls.
- Starch - feeds with higher starch contents include hominy, bakery by-product, and cereal by-product.
- Digestible Fiber - these feeds are useful to extend forage inventories and include citrus pulp, beet pulp, and soy hulls.
- Protein - an alternative protein source is corn gluten meal.
- Protein/fiber - wheat middlings and brewer grains provide both protein and fiber to the ration.
- Fiber/protein/fat - corn distiller grains and whole cottonseed are common sources of fiber, protein, and fat.

Often, alternative feeds are available for a limited time and need to be purchased and taken on short notice. In deciding whether or not to purchase an alternative feed consider storage time (especially for wet feeds), market availability, quality, consistency (lack of nutrient variability), storage costs, and any possible negative effects on rumen health.

The ultimate question is: can an alternative feed replace corn (or a portion of corn) without reducing lactational performance? It can be difficult to predict if an alternative feed (e.g., a by-product) is a good choice nutritionally in a particular ration without running a series of ration formulation analyses at varying prices of the by-product and different inclusion rates. This may help the user become more comfortable that the ingredient probably will work without compromising lactational performance, before incorporating the alternative feed into the ration. Additionally, an on-farm evaluation should occur.
What Informs Your Feeding Decisions?
After incorporating the alternative feed into the ration, it is important to determine if it was a good feeding decision based on responses in milk yield and components. For example, if you replace corn with a by-product feed and save $0.30/cow per day in feed cost without changing milk yield, it may seem like a good decision and great saving; but, you must consider production of milk components, not just overall milk yield. To do this, use values from your most recent milk check (component prices, producer price differential, and premiums).

Let us work through an example in which milk yield does not change, but milk component yields decline when a feed change is made.

For this example we use:
Protein: $2.4984/lb
Feed savings: $0.30/cow per day
Butter fat: $2.2113/lb
Number milking: 250 cows.

**Before** feeding change.
Milk production: 75 lb/day
Milk protein: 3.1%
Milk fat: 3.7%

**After** feeding change.
Milk production: 75 lb/day
Milk protein: 2.9%
Milk fat: 3.6%

To calculate the value of milk components before the feed change:
75 lb/cow per day x 3.1% protein = 2.325 lb of protein/cow per day
75 lb/cow per day x 3.7% fat = 2.775 lb of fat/cow per day

Milk component value=
(2.325 lb protein x $2.4984/lb) + (2.775 lb fat x $2.2113/lb) = $11.95

To calculate the value of milk components after the feed change:
75 lb/cow per day x 2.9% protein = 2.175 lb of protein/cow per day
75 lb/cow per day x 3.6% fat = 2.7 lb of fat/cow per day
Milk component value=
(2.175 lb protein x $2.4984/lb) + (2.7 lb fat x $2.2113/lb) = $11.40.

Compare savings vs. income:
Feed savings $0.30/cow per day x 250 cows = + $75/day
Milk component income lost = $11.40 (after) - $11.95 (before) = -$0.55/cow/day
-$0.55/cow per day x 250 cows = - $137.50/day
$75/day in feed savings + ($137.50/day) in lost income = - $62.50.

Although in this example saving $0.30/cow per day and maintaining milk yield may have appeared positive for farm financials, taking a few minutes to calculate the value of the components revealed that this was not a good feeding management decision and will cost the farm $62.50/day or $1,875/month. Rarely does it pay to sacrifice milk yield or milk components to save money. Other scenarios such as different prices, milk and/or component yields, may give different results.

Visit the MDR web site -- www.msu.edu/user/mdr/ to access a Feed Change Evaluator that calculates the net benefit (or cost) of a ration change.

**Conclusion**
The price of corn grain increased substantially during the last 2 years. The use of alternative by-product feeds may help to offset cost of the dairy ration. However, determining the marginal change in income (loss or gain) with a ration change, as in the example above, is the only way to know for sure if purchase and use of an alternative feed is a good decision or not. Also, careful consideration should be given to the handling, storage, variability, availability, and the nutrient content of alternative feeds and how the cows respond.

"**Alternative feeds may be available at competitive prices, but they need to be carefully evaluated as to how they might fit into the ration. It is important to decide which nutrient(s) you are seeking to replace by using alternative feeds.**"
Consider Increasing Your Farm’s Biosecurity and Awareness

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Dan Grooms, Dept. of Large Animal Clinical Sciences
Dean Ross, MSUE Emergency Management & Farm Safety Educator

Farm Management

Introduction

Recent world events in the Middle East and outbreaks of Foot-and-Mouth disease (FMD) in South Korea, suggest we should continue to update ourselves about possible threats to our food system. For livestock producers this means looking at biosecurity and emergency plans for all foreign animal diseases (FADs) including FMD, a highly contagious viral disease of cloven-hoofed animals. Foot and mouth disease affects cattle, swine, sheep, goats, deer and other ruminants. Livestock owners fear FMD because it spreads rapidly and results in severe economic losses, shutting down exports and loss of consumer confidence. A quick response is vitally important in containing an outbreak. We can learn from other countries’ response efforts to FADs. What you do to guard your business from other diseases will reduce the risk FADs entering your herd.

Five Things You Can Do

1. Develop or Enhance Your Visitors’ Policy: Visitors can be a route for disease transmission into your farm. Establishing a visitors’ policy for routine and non-routine visitors can reduce your risk. A visitors’ policy states what you expect each visitor to read and do while on your premises. Here is an example:

   VISITOR POLICY: “The health and welfare of our cattle and the safety of the product we produce is of highest priority to us. To help protect our cattle and you, we have developed a visitor’s policy.”
   • Do not enter farm animal facilities if you have been in another country in the past 7 days.
   • If you are coming from another farm, we ask that you do not come in contact with our animals if your clothes are soiled.
   • Sign our visitors’ log.
   • Wear plastic boots or clean and sanitize personal boots.
   • Please stay out of areas marked “Employees Only” or “Disease Prevention Area” (such as our calf facility).
   • Wash or sanitize hands prior to departure.
   • Enjoy your visit.

   It is important to communicate expectations and at the same time make people feel they are welcome particularly if you provide tours for the public. So there is a need to balance the openness of your facilities with appropriate, responsible biosecurity measures to reduce risks, knowing we cannot eliminate all risks.

2. Set Up Farm Gate Biosecurity Protocols

   Farm gate biosecurity and traffic control will reduce the risk of a number of diseases, including FMD, entering your farm. Some of these steps also enhance farm security. So consider it a form of general insurance, not just for the potential of FADs. Consider implementing the following farm gate biosecurity protocols.
   • One driveway as entry point to farm.
   • Designated visitor parking area.
   • “STOP” sign at driveway entry stating that all visitors must check with management before entering premises and animal facilities.
   • Sign-in log to screen visitors for recent visits to other farms and countries.
   • Boot disinfecting station(s), instructions, plastic boots and disposal container.
   • Vehicle wash station.
   • Foreign animal disease outbreak traffic control plan.

   See website at www.cvm.msu.edu/biosecurity for more information on setting up farm gate biosecurity protocols.

3. Know the Signs of FMD and Other FADs

   Contact your veterinarian any time you see any signs of disease that
are unusual. Early signs of FMD include:
- Drop in feed consumption and milk production of infected animals.
- Elevated temperatures, especially in young animals.

Followed by:
- Blisters (vesicles) and erosions ulcers in the mouth, on the tongue, muzzle and lips, on the teats and around the feet.
- Excessive salivation and saliva that is sticky, foamy and stringy.
- Lameness with reluctance to move.
- Abortions.

4. Increase Your Surveillance (Be Aware)
Surveillance is essential. Observe your animals daily for early signs of disease such as FMD. Train all individuals and employees who work with animals about the signs of disease. If you notice the signs that resemble those of FMD, call your veterinarian immediately, or the MDARD hotline at 517-373-1077 from 8 a.m. to 5 p.m. or 517-373-0440 after hours, or USDA APHIS at 517-324-5290.

Then:
- Self-quarantine your farm.
- Immediately implement strict biosecurity practices.

Quick action will reduce the impact of any FAD such as FMD on the livestock industry. Also train your family, neighbors and employees to watch for individuals who look out of place or are doing something suspicious. Having individuals sign in, wear boots and visitor tags will deter some unwanted individuals from entering or walking around your premises.

5. Review Information about FMD and Other FADs and What Would Happen if an Outbreak Occurred (Be Prepared)
There are four aspects you should be aware if a FAD outbreak occur in Michigan or anywhere else in the U.S.
- What to expect if a FAD outbreak is suspected in a herd.
- What to expect once FAD is confirmed in the first herd.
- What to do and your role if a FAD outbreak occurs anywhere in North America.
- Traffic control on your farm during a FAD outbreak. (These topics are covered in the two publications which are referenced in the electronic version of this article at, www.msu.edu/user/mdr/).

There is an FMD wall chart titled “Foot and Mouth Disease -- Prevention and Preparedness” at www.cvm.msu.edu/biosecurity/documents that you can print and post for family and employees. It is a PDF file and includes photos of signs of FMD. If you would like a laminated copy, email Ted Ferris, ferris@msu.edu.

A list of countries free of FMD can be found at: http://www.oie.int/en/animal-health-in-the-world/official-disease-status/fmd/list-of-fmd-free-members/

Other FADs include rift valley fever, contagious bovine pleuropneumonia, vesicular stomatitis, and heartwater. For more information on these diseases go to http://www.cfsph.iastate.edu/ or http://www.oie.int/animal-health-in-the-world/.

Check the bulk tank weights and feed intake weighs daily. Feed intake and milk production will drop before visual signs of FMD appear. These observations become very important if there was an FMD outbreak in North America.
Time to Review Sire Selection Criteria

Kathy Lee
Extension Dairy Educator

Introduction

Genetic improvement is a key factor in managing a profitable dairy herd. The majority of genetic improvement in dairy herds is achieved through genetically superior replacement heifers. Consequently, selection criteria for service sires should be updated routinely.

Net Merit (NM$) is a tool that can be used in dairy farms when making sire selection decisions. Net Merit which is computed by USDA Animal Improvement Programs Laboratory, estimates lifetime profit based on incomes and expenses relevant for today’s dairy producers. Traits included in NM$ are: fat (lb), protein (lb), productive life (mo), somatic cell score, udder composite, feet/leg composite, body size composite, daughter pregnancy rate, and calving ability($). Genetic evaluations are updated 3 times each year in April, August and December.

The relative economic weights for fat and protein used to compute NM$ closely reflect the multiple component pricing that applies to Michigan dairy producers. The emphasis on the health and fitness traits is based on the relative value of reducing those particular challenges in a herd.

The genetic merit of bulls marketed through artificial insemination (AI) organizations continues to improve with each release of updated genetic evaluations. Consequently, sire selection goals set by dairy producers a year ago may be outdated today.

The following table lists the NM$ values for various percentile ranking levels for each breed based on August 2011 genetic evaluations. Knowing where service sires rank relative to other active AI bulls is helpful in determining if the sires meet herd goals. To maximize genetic improvement, it is recommended that the service sires in your herd have an average NM$ at or above the 80th percentile.

### NM$ Levels of Top Percentiles for AI Sires by Breed. August 2011 USDA Sire Summary.

<table>
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<th>Percentile Ranking</th>
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<th>80</th>
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* Number of bulls in the current active AI population for each breed are in parentheses.

Conclusion

Herd using DHI services can obtain the average NM$ and percentile ranking of service sires from the DHI-202 Herd Summary or the PC-DART on-farm computer system. To ensure that a herd’s replacement heifers will be genetically superior, sire selection criteria should be reviewed and updated periodically. It is important to communicate these goals with semen sales representatives also.

Net Merit can be used as a key selection tool to identify high ranking service sires. Use the percentile ranking information to determine where your current group of service sires rank.

Reference

Sand Is Great for Cows, but Other Challenges Exist

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Introduction

The choice of free stall base and bedding is a critical decision and should reflect management style and goals. Sand is the gold standard for a freestall base and bedding. Maintaining a bed of loose sand, 6 inches minimum in depth, enhances cow comfort, improves lying time, contributes to good udder health and clean cows, and improves cow footing. The only reason for avoiding sand for free stalls, other than it not being available, is the difficulty it adds to the manure handling and storage system.

Sand in manure is abrasive to handling equipment and tends to settle in trenches, pipes, tanks, and storages. Experience has taught us that you should not put sand-laden manure in pits, pipes, trenches, or tanks which you cannot access easily in order to clean out the sand or grit that settles.

Managing sand-laden manure with daily haul or long-term concrete storages operated as skim-and-haul are time-proven methods. Additional water such as rain or milking center wastewater is usually excluded from the sand-laden manure to avoid dilution and unintentional settling of the sand.

Why We Separate Sand

Separating sand from the sand-laden manure is an option for those who want the benefits of bedding freestalls with sand without the aggravations that accompany sand in the manure. The separation options depend largely on the reasons for removing sand in the first place. There are three primary reasons.

1. To remove most, but not all, of the sand from the manure stream with no intention of using the removed sand for bedding. Just enough sand is removed to reduce downstream problems.

2. To reclaim sand clean enough for reuse as freestall bedding and take advantage of cost savings.

3. To create a “sand-free” manure stream for further treatment as well as reclaim sand for freestall bedding.

Actually, this list of reasons mirrors the progression of our past research on sand separation. We started with the goal of removing sand from the manure stream to reduce damage to equipment and sand settling in storage. Then we discovered that we could reclaim sand without manure solids being included. The fact that small quantities of sand remained in the manure stream was tolerated. More recently, we are seeing interest in manure treatment technologies that demand a “sand-free” manure stream. No sand should remain in the manure stream, and no manure solids should be left in the reclaimed sand.

Rule Number One:
“Don’t allow manure that contains sand or grit to enter places where, if it separates and settles any place, it could not be removed easily.”

Achieving the last goal presents a complex challenge. The ideal conditions for removing sand from manure are not necessarily the same as the conditions most ideal for reclaiming clean sand for reuse. Subsequently, systems in the third category must provide a high degree of control and likely will require more than one stage of separation. Sand-manure separation is not as simple as it first appears.

Here’s How It Works

Separation involves three components — sand, manure, and water. Diluted water is added to sand-laden manure at a minimum ratio of 1:1 (water to manure). The mixture is agitated vigorously, washing the sand grains and manure solids free of mucous that holds them together. They (sand grains) then act as discrete particles in the diluted mixture, and the more dense sand grains settle to the bottom. Manure
solids tend to settle as well, but, with just the right amount of buoyancy provided by moving water or injected air, the manure solids remain in suspension and are carried off with the manure stream.

Simply put, this difference in settling rates is the basis for all methods of separation currently in use — mechanical separators, cyclones, sand lanes, settling aprons and basins.

The degree of success depends on high-quality dilution water containing few manure solids and a velocity component for buoyancy to keep manure solids in suspension. In addition, choice of sand is important to the success of separation. Because sand grains vary in size and shape, they settle at different rates — coarse sand settles faster than fine sand. Unfortunately, fine-grained sands tend to settle at a similar rate as some of the manure solids which presents a challenge that can range from moderate, if some fine sand left in the manure stream is tolerable, to complex, if the goal is to reclaim sand for bedding and a sand-free manure stream.

**Conclusion**

Separating sand from sand-laden manure is a straightforward process. The challenge ranges from moderate to complex with the end use of the sand and the manure stream dictating the level of control that must be built into the system. In some cases, more than one stage of separation may be required. To be effective, any separation system requires time and attention and an operational plan that is followed consistently. A follow-up article will discuss what options are available to meet these different challenges.
Economics of Liquid Manure Transport and Land Application

Tim Harrigan
Dept. of Biosystems and Agricultural Engineering

Many of the questions that manure managers have relate to capacity, cost, and labor requirements of manure hauling systems. As farms have consolidated and increased in size manure handling equipment has evolved to transport and apply manure quickly and efficiently. Large spreader tanks, in excess of 10,000 gal, have been developed, the use of in-field manure transfer systems have improved the productivity of over-the-road nurse trucks, boom extensions have reduced the need for in-field truck maneuvering, and high-capacity pit and spreader pumps have reduced the time needed for loading, unloading and land application. We recently completed an economic evaluation of liquid manure hauling costs and labor needs with top-loading tank spreader systems on dairy farms based on the hauling rates (gal/hr) and efficiencies we observed on several well-managed livestock farms.

The cropping systems included acreage in alfalfa, corn silage and corn grain. The average manure hauling distance was 1, 1.5, 2, and 2.5 miles for 175-, 350-, 700- and 1400-cow farms, respectively. Some fields were as far as 2 miles from the manure storage on the 175-cow herd, 3 miles for the 350- and 700-cow herds, and 4 miles for the 1,400-cow herd. Tank spreaders ranged from 3,000 to 9,000 gal and the equipment used was sized to complete annual manure hauling operations in about twenty, 10-hr days (200 hr).

The economic evaluation included costs for agitation and pumping, over-the-road transport and land application by either injection with a 6-point injector or surface broadcast with tillage incorporation. The hauling rate declined rapidly as the distance increased. Compared with fields near the storage facility, the hauling rate fell by 20% with a 1-mile haul, 40% with a 2-mile haul and 50% with a 3-mile haul.

175-cow Dairy Example
The 175-cow dairy applied about 1.53 million gal/yr with an average hauling distance of 1 mile, but some fields were as much as 2 miles from the manure storage. Transport and application was with a 3,000 gal tank spreader and 120 hp tractor. Tillage incorporation was with an 18-ft disk and 140 hp tractor. The farm-average hauling rate was about 10,000 gal/hr, but the field-average rate ranged from 12,000 gal/hr for fields near the pit to 7,600 gal/hr for outlying fields. Eighteen days were needed for transport and land application.

The total cost for pumping, agitation, hauling, land application and tillage incorporation was 1.18 cents/gal (Figure 1 on page 14). Transport and land application accounted for two-thirds of the total cost. Manure agitation and pumping included 16 labor hours for set-up and agitation, plus agitation while the pump was filling the spreader. Pumping and agitation was about 14% of the total cost. Thirty-one hours were needed for tillage incorporation at a cost of $14.30/acre. Tillage incorporation accounted for 20% of the total hauling cost. The total cost for these operations was $103/cow per year or $74/acre.

Slurry injection eliminated the need for tillage incorporation and helped reduce odor and nitrogen loss, but increased the cost of transport and land application by a small amount. When slurry injection was used the farm-average hauling rate fell about 13% to 8,900 gal/hr. The field-average rate ranged from 10,300 gal/hr near the pit to 6,800 gal/hr for the outlying fields. Two additional days were needed for injection compared with a surface broadcast application because the unloading rate was less and more time was needed for maintenance of injectors. However, when the time for tillage incorporation was added to the time for surface broadcast, about 10 more hr (one additional day) was needed for broadcast and incorporation than for injection on the 175-cow farm.
The total cost for injection (1.22 cents/gal) was about 3% greater for broadcast with tillage incorporation. The annual cost for pumping, agitation, transport and injection was $73/acre or $107/cow per year, about $4/cow per year, more than with broadcast and incorporation.

1,400-cow Dairy Example
The 1,400-cow dairy applied 12.2 million gal/year with an average hauling distance of 2.5 miles but some fields were as far as 4 miles from the manure storage. Four 9,000 gal tank spreaders with 240 hp tractors were used for transport and broadcast application. The farm-average hauling rate was 72,400 gal/hr, but the field-average rate ranged from 90,300 gal/hr within 1 mile of the farm to 48,600 gal/hr with a 4-mile haul. Manure was incorporated with a 32-ft disk and 180 hp tractor. Two large lagoon pumps were used for pit pumping and agitation.

The total cost for pumping, agitation, hauling, land application and tillage incorporation was 1.34 cents/gal (Figure 2). Transport and land application accounted for 79%, pumping and agitation was 13% and tillage incorporation was 8% of the total cost. Surface broadcast application required 217 hr (21.7 days), tillage incorporation required 136 hr (13.6 days).

When slurry injection was used the farm-average hauling rate was 58,600 gal/hr, but the field-average rate ranged from 71,000 gal/hr near the storage to 42,700 gal/hr for outlying fields. Twenty-six days (260 hr) were needed for injection compared with 21.7
days (217 hr) for a broadcast application, but when the time needed for incorporation was included, the broadcast application required 90 more machine hours than injection. The total cost of injection (1.48 cents/gal) was 10% greater than broadcast with tillage incorporation. The annual cost for pumping, agitation, transport and injection was about $84/acre or $129/cow per year, about $13/cow per year greater than broadcast and incorporation.

Summary
Manure transport and land application is an expensive and time consuming process. The cost for pit agitation, pumping, and transport and land application ranged from 1.18 cents/gal ($103/cow/yr) for broadcast and incorporation for a 175-cow herd with a 1-mile haul to 1.48 cents/gal ($129/cow per year) for a 1,400-cow herd with tank spreaders, nurse trucks and subsurface injection. There was no cost advantage for large farms when manure handling equipment was selected to complete field operations within about 20, 10-hr days (200 hr) per year. The hauling efficiencies of larger tank spreaders were offset by the greater hauling distance for the larger herds.

Custom manure haulers have the skill, labor and specialized equipment to handle manure efficiently and effectively. Custom hire of manure application services may be a good management choice for many dairies. Based on a current value of $0.50/lb for commercial nitrogen, phosphorus and potassium, the nutrient value of liquid dairy manure with an analysis of 24 lb N:18lb P₂O₅:29 lb K₂O is about $36/1,000 gal. Manure managers can recover handling costs by testing soil and manure and reducing commercial fertilizer purchases when crop nutrient needs can be met by manure nutrients.

For additional information about the economic analysis and results reported in this article see, Hadrich, J.C., T.M. Harrigan and C.A. Wolf. 2010. Economic Comparison of Liquid Manure Transport and Land Application. Applied Engineering in Agriculture 26(5): 743-758. To contact by email, write to Tim Harrigan <harriga1@anr.msu.edu>.

“There was no cost advantage for large farms when manure handling equipment was selected to complete field operations within about 20, 10-hr days (200 hr) per year. The hauling efficiencies of larger tank spreaders were offset by the greater hauling distance for the larger herds.”

View the online version of MDR (including archived issues) at: www.msu.edu/user/mdr/
On July 22, the 11th annual Great Dairy Adventure was held. It attracted numerous children of all ages, parents and educators who learned about dairy cows, farming and dairy products through hands-on activities. Participants, some of whom are potential dairy professionals and enthusiasts, had the opportunity to pet a cow, experiment with dairy recipes, sample ice cream and cheese, and milk a cow by hand.

The adventure was part of the 13th annual Michigan Dairy Expo at the Michigan State University Pavilion for Agriculture and Livestock Education.

“The 2011 Great Dairy Adventure was attended by about 1,500 kids and adults” said Joe Domecq, MSU Extension dairy youth specialist and Expo director. “The extremely hot weather kept attendance down this year, but the people who did attend were introduced to many aspects of the dairy industry. Over 75 volunteers from across Michigan’s dairy industry worked to put on the Great Dairy Adventure, which is part of the Michigan Dairy Expo. Plans are already under way for 2012.”

On the wider scale, dairy producers from across the state and visitors of all ages came to the Expo to learn about Michigan’s dairy industry by visiting commercial exhibits and attending dairy management seminars and state breed shows. More than 500 dairy animals were on display by over 200 exhibitors during the 5-day event.
MSU Extension Online Resource for Farmers

MSU ANR Communications Staff

When farmers and others interested in agriculture want access to the latest information and research from Michigan State University Extension (MSUE) in one convenient, online location, MSU Extension News for Agriculture (http://news.msue.msu.edu) is quickly becoming farmers’ go-to source. The site contains the most recent and relevant information from MSUE educators throughout the state and at Michigan State University.

News for Agriculture helps MSUE educators extend their reach to wherever their expertise is needed in the state. Farmers, agribusiness professionals, and others involved in Michigan’s agriculture industry have immediate access to information important to the success of their operations.

The site features pertinent articles from more than 160 MSUE experts throughout the state in a variety of categories, including animal agriculture, plant-based agriculture, the bio-economy, business, home and garden, and organic agriculture. The site is updated daily to provide the most up-to-date, relevant information including hot topics and ways to deal with weather-related harvest and planting issues.

Coping With Impacts of Late Planting and High Feed Costs

For example, 2011 spring and summer weather has been a challenge for many Michigan farmers. Experts say the heavy spring rains that delayed planting, the summer heat wave and high feed prices will have a long-lasting effects. That is why MSUE educators and specialists have made key, relevant information quickly accessible for dairy, livestock and crop farmers at MSU Extension News for Agriculture.

“When you plant late, everything else is affected,” explains Roger Betz, MSU senior Extension Educator, who focuses on farm business management. “We are working to make sure we offer science-based, practical and timely information for farmers struggling with challenges related to late-planting, feed shortages, high feed costs, and harvest issues.”

Betz teamed with about 20 other educators and specialists to contribute information that specifically addresses solutions to challenges resulting from 2011 weather conditions. That information can be accessed at MSU Extension News for Agriculture. It is indexed under “Late planting issues, high feed cost issues,” found in the left-hand navigation on the traditional website and on the landing page of the mobile version of the same site.

Since the MSUE News for Agriculture site launched in March 2011, more than 100,000 visitors have accessed over 1,000 articles, worksheets and fact sheets provided by MSU Extension educators and scientists.

To learn more, visit http://news.msue.msu.edu.
What Is a Dairy Surplus Today?

Christopher Wolf
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The market volatility of the past few years has made it critical to understand the U.S. dairy market fundamentals. At the same time, many market changes have meant that old reference values are less useful. Consider stocks of dairy products.

For many decades the U.S. dairy industry was inward looking. While some dairy products were exported and some imported (about 5% in each case) the quantities were pretty much a wash. In addition, the Price Support Program often purchased cheese, butter and nonfat dry milk. So, while the Price Support Program kept the price from falling below the trigger level for any significant length of time, the government stocks that accumulated hung over the market and could dampen price recoveries.

In contrast to this situation, today dairy exports account for about 13% of U.S. milk solids produced and the Price Support is too low to be relevant, meaning that there are essentially no government stocks. Given these changes, some relevant questions are how to interpret the stocks of dairy products reported in the “Cold Storage” report and how much of these products it takes to represent a surplus that would adversely affect milk prices?

As of the most recent Cold Storage report (August), total cheese stocks stood at 1.085 billion lb. Historically, this would be considered a very large value (more than 25% higher than the average value) that would be bullish for milk prices. However, consider that 382.6 million lb of cheese were exported last year and that through the first 6 months of 2011 263.4 million lb were exported. Thus, the growth in exports has made the larger stocks not only palatable but, perhaps, necessary.

The U.S. still imports about 300 to 350 million lb of cheese each year. In general, the U.S. imports relatively expensive specialty cheese and exports less expensive commodity cheese. The countries importing the largest amount of cheese from the U.S. today are Mexico (for a long time the destination for the largest export), Korea and Japan.

Butter and nonfat dry milk are also important dairy exports. The destinations receiving the largest amount of U.S. butter in 2011 were Saudi Arabia, Belgium, and Egypt. The destinations receiving the largest amount of nonfat dry milk were Mexico, Vietnam, and the Philippines. Because most U.S. dairy exports are commodity products, as you can see, most of the major destinations are developing countries.

So, while imports have been very useful in soaking up U.S. dairy products, having 13% of U.S. milk solids exported means that the volatility in the world markets will more directly affect U.S. dairy farmers, cooperatives and processors. Back to the initial motivation for writing this article, understanding the dairy fundamentals today includes monitoring milk production in New Zealand and the European Union, and demand in Asia. Important also are exchange rates, trade agreements, and even such things as the credit crisis in Europe.

“The U.S. still imports about 300 to 350 million lb of cheese each year. In general, the U.S. imports relatively expensive specialty cheese and exports less expensive commodity cheese. The countries importing the largest amount of cheese from the U.S. today are Mexico (for a long time the destination for the largest export), Korea and Japan.”
Social Security Basics for Farmers [Part 1]*

Warren Schauer
Extension Business Management Educator

Introduction

Many farmers think of Social Security strictly in terms of retirement, unaware of the benefits available in situations of sudden death or a long-term medical disability. The majority of farmers won't have to take advantage of the disability or survivor portions of Social Security benefits. But all can profit from knowing exactly what the benefits are and considering them, along with other personal retirement resources in planning for the future.

How Much Do You Pay into FICA?

Let us start by looking at how much farmers or anyone pays into the Social Security system. Your Social Security contributions basically consist of Federal Insurance Contributions Act (FICA) taxes, which earners pay the government in exchange for financial assistance in retirement and disability, survivor and Medicare benefits.

Most full-time farmers are self-employed and would pay FICA taxes amounting to 13.3% of earnings. Of that 13.3%, the Social Security portion is 10.4%. The remaining 2.9% is for Medicare. The Social Security portion is paid on earnings up to $106,800 for 2011. There is no limit on the Medicare portion. The 10.4% rate is only for 2011.

If you’re a farm employee and receive a W-2 form each year, for 2011 you pay 5.65% of your salary in FICA taxes. Your employer contributes 7.65% up to the maximum earnings limit of $106,800.

If you earn more than $106,800, you still pay Medicare taxes of 1.45% on all your earnings. But you don’t pay the 5.65% portion on any earnings beyond $106,800. Remember, however, that the maximum earnings limit goes up each year. Also the 5.65% rate is only for 2011.

If you’re considered contract labor and receive a ‘1099’ at the end of the year, or if you’re self-employed as are most farmers, then you must pay the entire amount yourself. That amounts to 13.3% of your net self-employment income up to the $106,800 earnings limit. You also pay 2.90% (1.45% x 2) for Medicare on all earnings over the limit.

The reason for the larger amount for self-employed workers is that you’re responsible for the entire amount because you have no employer to match your contribution.

Your Social Security Statement

Each year — about 3 months prior to your birthday — you should receive a Social Security statement at your home address (the address listed on your previous year’s tax return). The Social Security Administration is required by law to provide these statements to all workers 25 and older who are not already receiving monthly Social Security benefits.

This 4-page document lists your estimates of retirement, survivor and disability benefits. It’s also an easy way to ensure your earnings or self-employment income is accurately posted. It’s very important to check your earnings for accuracy since your eventual benefits are based on your lifetime earnings.

Confirming that your numbers are accurate is particularly important if you’ve worked for an operation that’s no longer in business due to bankruptcy, for instance. It is common for an employee to have a year of missed earnings from a bankrupt operation.

In that case, you need to provide your original W-2 from that year to ensure that you are credited for those missing earnings, even though the company is no longer in business. Not all bankrupt operations fail to report earnings, but some do fail to pay all their FICA taxes.

Calculation Formula

Social Security uses your entire earnings record to determine your benefits. For full retirement-age workers, this is the formula. First, your wages are indexed to current wage standards. Your 1975 earnings, for example, are probably considerably less than your income today. After indexing, they become much closer than you would think.
Second, the highest 40 years of an individual’s earnings are determined. Then the 5 lowest years of earnings are eliminated, leaving the highest 35 years to determine an individual’s level of benefits. This is divided by the number of months, to result in the average indexed monthly earnings.

Third, this figure is applied to the formula specified by Congress to determine the monthly benefit amount, taking into account your age at retirement.

Upon receiving your Social Security statement, you and your spouse should review the benefits on your record. It is common for a married couple that has worked together in a family farm operation to file all the self-employment income under the husband's Social Security number as a way to reduce tax obligations.

In such a case, the wife has worked for the farm business but was never paid a salary, leaving her with no earnings posted to her Social Security number. Without an earnings record, she’s ineligible for Social Security benefits based on her own earnings record, and she may only be eligible for widow’s benefits if the husband dies, or spouse’s benefits when they both reach retirement age.

If a tragedy strikes, such as death or disability, your spouse needs to be aware of the family’s eligibility for Social Security benefits. The Social Security statements provide this information.

The next part of this series will discuss retirement income, disability and survivor benefits from Social Security. For more information, log on to www.socialsecurity.gov or contact your local Social Security office.

*This is Part 1 of a two-part series on Social Security. This series is based on information from the Social Security Administration and reviewed by Robert Simons from the Escanaba Social Security office Upper Peninsula, MI.

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Livestock Gross Margin Insurance for Dairy: Part 1

Craig Thomas
Extension Dairy Educator

Introduction
Livestock Gross Margin Insurance for Dairy (LGM-Dairy) is a subsidized insurance policy that provides protection to dairy producers against the loss of gross margin (market value of milk minus feed costs) for specified portions of milk produced by their dairy cows. Livestock Gross Margin Insurance for Dairy establishes a floor (minimum) on income over feed costs (IOFC), ensuring that the gross margin will not be less than the amount specified in the LGM-Dairy policy. It is a risk management tool very similar to using a bundled options strategy (see Figure 1 on page 23). In a bundled options risk management strategy the producer uses Class III milk put options to create a milk revenue floor (minimum) and feed (corn, soybean meal) call options to establish a feed cost ceiling (maximum). The “bundling” of the put and call options allows the producer to establish an IOFC floor (minimum). The effect of LGM-Dairy and the bundled options strategy are identical (Figure 1).

Benefits of LGM-Dairy
Livestock Gross Margin Insurance for Dairy has several advantages over traditional hedging using Class III futures contracts; a bundled options strategy; or co-op sponsored forward (fixed) price contracts:
1. Hedging and forward contracts “lock in a milk price” and, unlike LGM-Dairy, provide no upside milk price potential;
2. Hedging has daily margin requirements while LGM-Dairy does not;
3. Contract size in hedging and bundled options strategies is limited to increments of 200,000 lb of milk, 5,000 bushels of corn, and 100 tons of soybean meal while LGM-Dairy has a completely flexible contract size;
4. Cost of an LGM-Dairy policy is the policy premium, and is known before entering into the contract;
5. The cost of insurance in an LGM-Dairy policy is much cheaper than in a similar bundled options strategy because the premium is subsidized; and,
6. Livestock Gross Margin Insurance for Dairy does not require an established contract with a commodities broker or a milk marketing entity that offers forward price contracts. Very importantly, LGM-Dairy’s only cost is the cost of the insurance policy and the contract guarantees a minimum IOFC for covered milk production, but does not limit the producer from participation in higher milk prices (Figure 2 on page 23) and/or lower feed (corn, soybean) prices (Figure 3 on page 23).

LGM-Dairy is a program administered by the USDA’s Risk Management Agency, but LGM-Dairy policies are purchased from firms selling federal crop insurance. Crop insurance agents must be certified to sell LGM-Dairy and have an identification number on file with the Federal Crop Insurance Corporation. A list of approved agents can be obtained from a University of Wisconsin website -- http://future.aae.wisc.edu; click on the “LGM-Dairy” tab, then click on the “List of LGM-Dairy Providers.”

Livestock Gross Margin Insurance for Dairy is available for purchase each month (12 contracts/year) and each contract covers from 1 to 10 months (Figure 4 on page 23). Unfortunately, LGM-Dairy has a very short period each month when the product can be purchased. The LGM-Dairy purchase period starts at the end of the last business Friday of each month and ends at 9:00 p.m. ET the next day (Saturday); therefore, there is only about a 27-hour sign-up window every month. This makes it critical that producers work with their insurance agent in advance of the sign-up period.

Overview of LGM-Dairy
The purpose of LGM-Dairy is to provide insurance protecting a minimum IOFC. This is achieved by first establishing an expected gross margin (GM).

\[
\text{Expected Gross Margin (GM) = expected market value of milk minus expected feed costs.}
\]

Feed usage in LGM-Dairy is expressed as corn and soybean meal (SBM) equivalents. The LGM-Dairy program allows the producer to select from a wide usage range for these two feed equivalents. The producer may choose any feed usage numbers desired, even
if they do not accurately represent their farm’s actual feed usage, as long as they stay within the LGM-Dairy’s feed usage limits. If desired, producers may also convert the portion of their dairy rations that are not corn or SBM (for example, homegrown feeds like corn silage or haylage) to corn and SBM equivalents. The University of Wisconsin “Understanding Dairy Markets” website has software available to convert a wide variety of dairy feeds to corn and SBM equivalents.

Doing the Calculations

Once expected milk production and feed usage are determined, the GM can be calculated. *Expected milk*, corn, and SBM prices are derived from futures prices on the Chicago Mercantile Exchange (CME) for the three commodities: Class III milk, corn, and SBM. *Expected prices* are the average of the last three days of futures settlement prices for each month and commodity including the sign-up Friday. In the example (Figure 4), the expected prices would be the three-day futures settlement price averages for Class III milk, corn, and SBM on Sept. 28, 29, and 30, 2011. Fortunately, producers do not have to collect this information and make the calculations on their own. The University of Wisconsin web page has a web-based software (LGM-Dairy Analyzer v. 2.0) available that provides these data and makes all the necessary calculations.

Like most insurance, LGM-Dairy allows the producer to select a deductible. The higher the deductible selected the more risk the producer assumes, but the lower the premium becomes on the LGM-Dairy contract. Deductibles are available from $0.00/cwt of insured milk to $2.00/cwt of insured milk in $0.10/cwt increments. As LGM-Dairy deductibles increase the amount of insurance premium subsidy also increases (Table 1). The premium subsidy is expressed as the percentage the premium is reduced to. For example, if a $0.50/cwt deductible is chosen, the premium for that covered month would be reduced by 28%. A producer must have targeted marketings in 2 or more months to qualify for the premium subsidy.

Once the deductible is selected it is possible to calculate the gross margin guarantee (GMG). *Gross Margin Guarantee* = GM minus deductible. The deductible is the portion of the GM you choose to leave unprotected.

The final calculation needed in the LGM-Dairy program is the *actual gross margin*: 

*Actual Gross Margin (AGM) = Actual market value of milk minus actual feed cost.*

The futures markets also are used to determine the actual milk, corn, and SBM prices. Very importantly the LGM-Dairy program uses no actual farm level prices, involves no futures market transactions, and no local basis is used to adjust commodity prices. Actual prices for Class III, corn, and SBM are the average CME futures settlement prices for the first, second, and third days prior to the futures contract last trading day.

Let us use October, 2011 as an example: The last trading day for corn and SBM futures is Oct. 14, so the actual October corn and SBM prices will be the average futures settlement prices for Oct. 11, 12, and 13. The last trading day for Class III milk is Oct. 30, so the actual October Class III price will be the average futures settlement prices on Oct. 27, 28, and 29.

In LGM-Dairy an indemnity payment occurs when the total actual gross margin (AGM<sub>Total</sub>) for an LGM-Dairy contract period is less than the total gross margin guarantee (GMG<sub>Total</sub>). That is, an indemnity (payout) occurs if: AGM<sub>Total</sub> < GMG<sub>Total</sub>.

It is important to remember that there is only one AGM<sub>Total</sub> and one GMG<sub>Total</sub> per LGM-Dairy contract, thus, the contract is evaluated over the entire contract period. In other words, indemnity payments in months where the AGM is less than the GMG may potentially be offset by other covered months where the AGM is greater than the GMG.

### Table 1: LGM-Dairy insurance deductibles and premium subsidies.

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Figure 1: Effect of LGM-Dairy insurance or bundled options strategy using Class III put options and corn and soybean meal call options.

Figure 2: LGM-Dairy insurance permits producer to participate in milk prices higher than specified in the LGM-Dairy policy. Does Not Limit Upside Milk Price Potential

Figure 3: LGM-Dairy insurance permits producer to participate in feed prices lower than specified in the LGM-Dairy policy. Does Not Limit Downside Feed Price Potential

Figure 4: LGM-Dairy insurance contract period for insurance purchased in the September, 2011 sales period.

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