Hauling manure to fields for application is an expensive task, but there is a silver lining—nitrogen, phosphorus, potassium, and micro-nutrients all come along for the ride.

Nitrogen can be lost just as quickly as it can be retained. However, retaining it for the coming crop can save $40, $50 or even $60 per acre at today’s nitrogen prices. Add in the other nutrients and manure quickly commands the respect of purchased fertilizer. Deficiencies of nitrogen can be dealt with by side dress fertilizers—high nitrate soil tests indicate manure rates should be reduced.

From a management standpoint, nitrogen and phosphorus are the critical nutrients demanding attention. Begin managing them by having soil tests conducted and apply manure nutrients to the fields testing lowest in phosphorus.

Second, apply manure on fields that will be planted with high nitrogen demand crops such as corn and sugar beets.

Third, apply manure as if it were fertilizer. You should know the nutrient content (fertilizer analysis), spread evenly, calibrate for desired nutrient values, and keep records.

There are some other principles that relate to manure nitrogen. If left on the surface of dry soil during warm temperatures, the ammonia portion of manure will volatilize.

Fertilizer prices make manure nutrients a valuable resource. Manure land application rates, timing, and method are complicated by temperature and weather. Pre-side dress nitrate soil tests, when administered properly, provide an accurate method of measuring the plant-available nitrogen in soil. This nitrogen is readily utilized by the plants at a cost savings in purchased fertilizer.

Deficiencies of nitrogen can be dealt with by side dress fertilizers—high nitrate soil tests indicate manure rates should be reduced.
PRE-SIDE DRESS NITRATE TESTING

Sharon Williams, a part-time Michigan State University technician working with Extension Educator Natalie Rector on manure nutrient management, takes soil samples at side dress time, 2005, to be analyzed for nitrate. Taking soil samples at side dress time allows for adjusting side dress rates of nitrogen fertilizer based on the nitrogen credit found in the soils resulting from manure applications.

into the air and be lost for crop production. If applied on wet soils, some may denitrify and be lost into the air.

The goal is to spread manure such that it is placed and retained in the root zone for crop uptake.

Some people assume all the nitrogen from surface-applied manure volatilizes to the air and is lost. This is not the case. The ammonia fraction of nitrogen in manure can volatilize, but manure also has an organic fraction of nitrogen that does not volatilize. A portion of that will become available for plant use.

Under hot and dry summer conditions, when manure is applied with no incorporation, virtually all of the ammonia fraction is lost. When moved into the soil by rain or incorporation, volatilization will be reduced. When injected, loss of ammonia nitrogen will be negligible, but it is hard to estimate how much will still be there the following spring when the crop is planted.

When manure is surface applied in the winter during cold temperatures, not all of the ammonia is lost into the air.

In the spring, if manure is surface applied when cool and the soils are damp, potentially little ammonia is lost into the air. The same surface application in the spring on dry soil and with temperatures greater than 50 degrees Fahrenheit can result in significant ammonia loss.

In all of the above scenarios, only the ammonia fraction of nitrogen in the manure is being considered. As previously stated, manure also contains organic nitrogen, which is slowly broken down over several years with 25 to 35% becoming available the first year.

A Practical Example

A typical dairy manure from the lactating herd, applied at 6,000 gallons per acre, may contain about 150 pounds of plant-available nitrogen when injected or incorporated within 1 day of application. The same manure could be broadcast under warming conditions and within 1 week lose up to 75% of the potential nitrogen just by lack of incorporation. That brings down the plant-available nitrogen credit to only 35 pounds
per acre. At 40 cents per pound of nitrogen, the difference between 150 and 35 pounds of nitrogen results in $46 per acre out of your pocketbook. On 100 acres, that will be $4,600 of lost nitrogen. The manure had to be hauled anyway—a little more time spent on effective incorporation can be well worth it with today’s nitrogen costs.

The nitrogen in swine manure tends to be higher in the ammonia form than dairy manure, making injection or immediate incorporation even more cost-effective.

All manures have a different nitrogen test and percentage in the ammonia fraction, so go by the actual analysis of manure samples, not the examples listed above. Be sure to have the manure analyzed for ammonia content, not just the total nitrogen content.

Because soil moisture, temperature, manure type, and application method impact plant-available nitrogen greatly, how can a farmer be sure there is sufficient nitrogen available for the coming season?

One answer is pre-side dress nitrate soil testing. PSNT can provide an accurate method of measuring the plant-available nitrogen in the soil at side dress time, thereby quantifying the impact of all the factors mentioned above. This soil test is different than traditional soil tests, so there are unique guidelines to be followed.

- The PSNT measures the nitrate form of nitrogen readily available to plants.
- Collect PSNT samples 5 to 14 days before you plan to side dress so results can be received from the soil laboratory in time to adjust the side dress rate. Taking samples earlier in the season will not provide adequate credit for nitrogen that becomes available from the manure.
- If more than 40 pounds of actual nitrogen already has been applied as fertilizer, the PSNT may not be accurate for measuring manure nitrogen. If the nitrogen has been applied in a starter band, avoid this area when soil sampling.
- Soil samples should represent no more than 20 acres. The sampled area should be consistent for past crop, soil types, and manure applications.
- Probe soil 12 inches deep if possible, indicating the depth of the soil sample on the laboratory submission form. Take 15 to 20 probes per composite sample.
- Air dry samples as soon as they are taken. Do not put damp soil samples in plastic bags. If the soil samples cannot be dried right away, keep them cool, less than 45 degrees Fahrenheit.
- Deliver soil samples directly to a laboratory or express mail the air-dried samples. The Michigan State University Soil Testing Laboratory or other commercial laboratories are set up to conduct the PSNT and return results in 24 to 48 hours. Visit <http://www.rootzone.msu.edu> for more information.
Opportunities for Conserving Energy and Saving Money in Dairy Operations

The rising price of energy is putting a strain on many dairy businesses. Several recent studies targeting energy use in production facilities and farms identified steps dairy producers can take to save energy and help keep their businesses strong. Many measures, such as milk plate pre-coolers, can pay for themselves in just a few years.

David I. Johnson
Dept. of Fisheries and Wildlife

Planning an energy budget is difficult, but with the cost of natural gas, heating oil, and other energy sources higher than a year ago, budgeting for the increased price of fuel and electricity is imperative. Fortunately, there are alternative methods dairy producers can employ to lessen the strain of skyrocketing energy costs. Recent studies, several of which will be reviewed in this article, indicate that installing plate coolers, variable speed drives (VSD) for pumps, energy saving lights, and other measures can slash energy bills. In fact, a dairy farm with an energy-efficient milking system can save 50 to 70% of electricity costs and have a payback period of less than 2 years (1).

The first study to be reviewed is based on a set of 32 farm audits done by DLTech, Inc. and supported by the New York State Energy Research and Development Authority’s FlexTech Program (2). The objective of the study was to provide dairy operators with good data on energy use for decision-making. Eighteen farms with free stalls and milking parlors and 14 farms with tie stalls and milk pipelines were used to examine energy use and conservation.

It is apparent from Figure 1 that the largest consumers of energy in both types of farms in decreasing order are milk cooling (25%), lighting (24%), ventilation (22%) and vacuum pumps (17%). The improved efficiency of VSDs in vacuum pumps has dropped this long-run use to fourth place whereas features associated with housing such as lighting and ventilation have increased energy consumption.

This study focuses on energy used in farms with both free and tie stalls, but these results indicate the areas on all dairy farms that have the greatest potential impact on energy conservation. Ultimately, the study recommends milk plate pre-coolers as having the fastest payback in farms with free stalls, but energy efficient lighting provides the fastest payback in farms with tie stalls. VSDs for the vacuum system saved the most energy in both types of farms.

The DLTech study parallels the recommendations from Efficiency Vermont (3). The Vermont study recommends the following strategies.

- Milk cooling—plate coolers reduce cooling costs by 50%.
- Milk transfer—move your milk through the plate cooler with a VSD pump.
- Vacuum pump controllers—VSDs and variable frequency drives (VFDs) can drop pump operating costs by 66%.
- Water heating—utilize a heat recovery system from your compressor to pre-heat water.
- Fuel—switch to a less expensive fuel or a more efficient fuel burning system (80 to 93% efficiency gas burner).
- Energy saving lights—replace incandescent lights with compact fluorescent lights, or replace T-12 fluorescent tubes and mechanical ballasts with T-8 tubes and electronic ballasts to see 65% electrical savings.

Efficiency Maine (4) amplifies the function of in-line water-cooled plate coolers with the following information. The well water flowing through the plate cools the milk as it is being pumped to the bulk tank, which can reduce the tank milk temperature some 30 degrees Fahrenheit. This pre-cooling dramatically decreases the electricity used by the tank refrigeration system for milk cooling. For maximum efficiency, optimize your pre-cooling performance by selecting a large...
Reproduction Management

Discovery of a Potential New Measure for Fertility in Cattle

Ovarian follicular development in cattle has been studied but until recently little was known about the relationship between fertility and the number of follicles growing in follicular waves. Serendipity, skepticism and informal discussions led to a recent study at Michigan State University that found the numbers of follicles growing during follicular waves in cattle may be used to identify not only the highly fertile animals in a herd, but also those that respond best to superovulation.

James J. Ireland
Dept. of Animal Science

The importance of follicular waves in cattle has been discussed in two previous Michigan Dairy Review articles (What Do Dairy Cows Have in Common with Chickens and Lake Michigan? May 1999 and Tick-tock? July 2002). Based on our understanding of growth and function of dominant follicles during follicular waves, reproductive physiologists have learned a great deal about how to manipulate the estrous cycle to improve reproductive management. For example, Richard Pursley in our Department of Animal Science at Michigan State University collaborated with Milo Wiltbank at the University of Wisconsin to develop Ovsynch, an efficient method which has been adopted widely by the dairy industry to regulate dominant follicle growth and ovulation during the follicular waves occurring in estrous cycles of cattle (Figure 1).

Moreover, we now understand that some of the variation associated with responses of cattle to superovulation procedures is attributable to the presence of dominant follicles on ovaries, which diminishes growth of new follicles during treatments. So, improvements in superovulation will require better control over dominant follicle growth during follicular waves. Most importantly, future advances in management of reproductive efficiency of cattle should be based on the understanding that groups of ovarian follicles grow in recurrent waves as depicted in Figure 1 and follicular waves are required for the normal development, function, and ovulation of dominant ovulatory follicles.

Pursley worked with graduate student Nora Bello to take advantage of this new information to generate preliminary data indicating that shortening the lifespan of the dominant follicle during follicular waves by only a couple of days may improve fertility in dairy cows. The information in Figure 1 also has been used in my laboratory to design studies that take advantage of the variation in number of follicles growing during follicular waves to develop new ways to predict fertility in cattle.

Follicular Waves and Fertility

That’s all very interesting stuff, you might say, but what do follicular waves have to do with discovery of a new measure for fertility? During discussions with Department of Animal Science colleagues, it dawned on me that the variation in numbers of follicles and oocytes (eggs) in ovaries (also called the ovarian reserve) may have an important but overlooked role in fertility of cattle.

We all agreed that little was known about the degree of variation in follicle numbers growing during follicular waves and even less about the importance of the variation in follicle numbers to fertility. A search turned up no information on the importance of the variation of follicle numbers during waves to fertility, but did reveal numerous research articles reporting that high compared with relatively low numbers of follicles in ovaries of a variety of species, including cattle, are positively associated with numerous measures of fertility including responses to superovulation, in vitro fertilization rate, embryo recovery, return to estrus postpartum, and the number of calves born.

Reproduction Management

Discovery of a Potential New Measure for Fertility in Cattle

Ovarian follicular development in cattle has been studied but until recently little was known about the relationship between fertility and the number of follicles growing in follicular waves. Serendipity, skepticism and informal discussions led to a recent study at Michigan State University that found the numbers of follicles growing during follicular waves in cattle may be used to identify not only the highly fertile animals in a herd, but also those that respond best to superovulation.

James J. Ireland
Dept. of Animal Science

The importance of follicular waves in cattle has been discussed in two previous Michigan Dairy Review articles (What Do Dairy Cows Have in Common with Chickens and Lake Michigan? May 1999 and Tick-tock? July 2002). Based on our understanding of growth and function of dominant follicles during follicular waves, reproductive physiologists have learned a great deal about how to manipulate the estrous cycle to improve reproductive management. For example, Richard Pursley in our Department of Animal Science at Michigan State University collaborated with Milo Wiltbank at the University of Wisconsin to develop Ovsynch, an efficient method which has been adopted widely by the dairy industry to regulate dominant follicle growth and ovulation during the follicular waves occurring in estrous cycles of cattle (Figure 1).

Moreover, we now understand that some of the variation associated with responses of cattle to superovulation procedures is attributable to the presence of dominant follicles on ovaries, which diminishes growth of new follicles during treatments. So, improvements in superovulation will require better control over dominant follicle growth during follicular waves. Most importantly, future advances in management of reproductive efficiency of cattle should be based on the understanding that groups of ovarian follicles grow in recurrent waves as depicted in Figure 1 and follicular waves are required for the normal development, function, and ovulation of dominant ovulatory follicles.

Pursley worked with graduate student Nora Bello to take advantage of this new information to generate preliminary data indicating that shortening the lifespan of the dominant follicle during follicular waves by only a couple of days may improve fertility in dairy cows. The information in Figure 1 also has been used in my laboratory to design studies that take advantage of the variation in number of follicles growing during follicular waves to develop new ways to predict fertility in cattle.

Follicular Waves and Fertility

That’s all very interesting stuff, you might say, but what do follicular waves have to do with discovery of a new measure for fertility? During discussions with Department of Animal Science colleagues, it dawned on me that the variation in numbers of follicles and oocytes (eggs) in ovaries (also called the ovarian reserve) may have an important but overlooked role in fertility of cattle.

We all agreed that little was known about the degree of variation in follicle numbers growing during follicular waves and even less about the importance of the variation in follicle numbers to fertility. A search turned up no information on the importance of the variation of follicle numbers during waves to fertility, but did reveal numerous research articles reporting that high compared with relatively low numbers of follicles in ovaries of a variety of species, including cattle, are positively associated with numerous measures of fertility including responses to superovulation, in vitro fertilization rate, embryo recovery, return to estrus postpartum, and the number of calves born.

Reproduction Management

Discovery of a Potential New Measure for Fertility in Cattle

Ovarian follicular development in cattle has been studied but until recently little was known about the relationship between fertility and the number of follicles growing in follicular waves. Serendipity, skepticism and informal discussions led to a recent study at Michigan State University that found the numbers of follicles growing during follicular waves in cattle may be used to identify not only the highly fertile animals in a herd, but also those that respond best to superovulation.

James J. Ireland
Dept. of Animal Science

The importance of follicular waves in cattle has been discussed in two previous Michigan Dairy Review articles (What Do Dairy Cows Have in Common with Chickens and Lake Michigan? May 1999 and Tick-tock? July 2002). Based on our understanding of growth and function of dominant follicles during follicular waves, reproductive physiologists have learned a great deal about how to manipulate the estrous cycle to improve reproductive management. For example, Richard Pursley in our Department of Animal Science at Michigan State University collaborated with Milo Wiltbank at the University of Wisconsin to develop Ovsynch, an efficient method which has been adopted widely by the dairy industry to regulate dominant follicle growth and ovulation during the follicular waves occurring in estrous cycles of cattle (Figure 1).

Moreover, we now understand that some of the variation associated with responses of cattle to superovulation procedures is attributable to the presence of dominant follicles on ovaries, which diminishes growth of new follicles during treatments. So, improvements in superovulation will require better control over dominant follicle growth during follicular waves. Most importantly, future advances in management of reproductive efficiency of cattle should be based on the understanding that groups of ovarian follicles grow in recurrent waves as depicted in Figure 1 and follicular waves are required for the normal development, function, and ovulation of dominant ovulatory follicles.

Pursley worked with graduate student Nora Bello to take advantage of this new information to generate preliminary data indicating that shortening the lifespan of the dominant follicle during follicular waves by only a couple of days may improve fertility in dairy cows. The information in Figure 1 also has been used in my laboratory to design studies that take advantage of the variation in number of follicles growing during follicular waves to develop new ways to predict fertility in cattle.

Follicular Waves and Fertility

That’s all very interesting stuff, you might say, but what do follicular waves have to do with discovery of a new measure for fertility? During discussions with Department of Animal Science colleagues, it dawned on me that the variation in numbers of follicles and oocytes (eggs) in ovaries (also called the ovarian reserve) may have an important but overlooked role in fertility of cattle.

We all agreed that little was known about the degree of variation in follicle numbers growing during follicular waves and even less about the importance of the variation in follicle numbers to fertility. A search turned up no information on the importance of the variation of follicle numbers during waves to fertility, but did reveal numerous research articles reporting that high compared with relatively low numbers of follicles in ovaries of a variety of species, including cattle, are positively associated with numerous measures of fertility including responses to superovulation, in vitro fertilization rate, embryo recovery, return to estrus postpartum, and the number of calves born.

Reproduction Management

Discovery of a Potential New Measure for Fertility in Cattle

Ovarian follicular development in cattle has been studied but until recently little was known about the relationship between fertility and the number of follicles growing in follicular waves. Serendipity, skepticism and informal discussions led to a recent study at Michigan State University that found the numbers of follicles growing during follicular waves in cattle may be used to identify not only the highly fertile animals in a herd, but also those that respond best to superovulation.

James J. Ireland
Dept. of Animal Science

The importance of follicular waves in cattle has been discussed in two previous Michigan Dairy Review articles (What Do Dairy Cows Have in Common with Chickens and Lake Michigan? May 1999 and Tick-tock? July 2002). Based on our understanding of growth and function of dominant follicles during follicular waves, reproductive physiologists have learned a great deal about how to manipulate the estrous cycle to improve reproductive management. For example, Richard Pursley in our Department of Animal Science at Michigan State University collaborated with Milo Wiltbank at the University of Wisconsin to develop Ovsynch, an efficient method which has been adopted widely by the dairy industry to regulate dominant follicle growth and ovulation during the follicular waves occurring in estrous cycles of cattle (Figure 1).

Moreover, we now understand that some of the variation associated with responses of cattle to superovulation procedures is attributable to the presence of dominant follicles on ovaries, which diminishes growth of new follicles during treatments. So, improvements in superovulation will require better control over dominant follicle growth during follicular waves. Most importantly, future advances in management of reproductive efficiency of cattle should be based on the understanding that groups of ovarian follicles grow in recurrent waves as depicted in Figure 1 and follicular waves are required for the normal development, function, and ovulation of dominant ovulatory follicles.

Pursley worked with graduate student Nora Bello to take advantage of this new information to generate preliminary data indicating that shortening the lifespan of the dominant follicle during follicular waves by only a couple of days may improve fertility in dairy cows. The information in Figure 1 also has been used in my laboratory to design studies that take advantage of the variation in number of follicles growing during follicular waves to develop new ways to predict fertility in cattle.

Follicular Waves and Fertility

That’s all very interesting stuff, you might say, but what do follicular waves have to do with discovery of a new measure for fertility? During discussions with Department of Animal Science colleagues, it dawned on me that the variation in numbers of follicles and oocytes (eggs) in ovaries (also called the ovarian reserve) may have an important but overlooked role in fertility of cattle.

We all agreed that little was known about the degree of variation in follicle numbers growing during follicular waves and even less about the importance of the variation in follicle numbers to fertility. A search turned up no information on the importance of the variation of follicle numbers during waves to fertility, but did reveal numerous research articles reporting that high compared with relatively low numbers of follicles in ovaries of a variety of species, including cattle, are positively associated with numerous measures of fertility including responses to superovulation, in vitro fertilization rate, embryo recovery, return to estrus postpartum, and the number of calves born.
An Aid to Evaluating the Protein Status of Your Herd: Milk Urea Nitrogen Testing

Bulk tank milk urea nitrogen (MUN) data may be a useful tool to assist in monitoring the feeding program and perhaps to relate to excessive nitrogen excretion in manure. Obtaining a bulk tank milk sample to determine MUN is a useful aid to evaluate the nitrogen (protein) status of the milking cows in a herd. Monitoring bulk tank MUN concentrations has potential as a management tool to evaluate protein feeding of individual herds.

Recently, Michigan Milk Producers Association (MMPA) and other milk marketing organizations began testing for milk urea nitrogen (MUN) from bulk tank samples. Dairy Herd Improvement (DHI) testing organizations also provide MUN testing for samples from individual cows.

What is MUN?

Urea is a normal constituent of blood and body fluids, such as milk. It is formed from ammonia, which is produced in a cow’s rumen from the breakdown of feed proteins and from normal daily metabolism of absorbed amino acids and body proteins. Ammonia is transported in blood to the liver and kidneys where it is converted to urea. Excess ammonia circulating in blood is very toxic and urea is much less so. The conversion of blood ammonia to urea is the body’s way of preventing ammonia toxicity. This conversion of ammonia to urea occurs in mammals including humans and is part of normal body metabolism. The body excretes excess blood urea in urine and milk. Urea is a normal constituent of milk and is part of the non-protein nitrogen fraction of milk. Urea circulating in a dairy cow’s blood and in milk is closely related. Obtaining a bulk tank milk sample to determine MUN is a much easier, non-invasive way of evaluating nitrogen (protein) status of all the milking cows in a herd than obtaining a blood sample from a number of individual cows. Therefore, monitoring bulk tank MUN concentrations has potential

as a management tool to evaluate protein feeding of individual herds.

Testing for MUN

Urea concentrations in blood are affected by two factors: the breakdown of dietary protein to ammonia by rumen microorganisms and the normal body metabolism of tissue protein. Much of the dietary protein that enters the rumen is degraded to ammonia by the microorganisms and then utilized to synthesize ruminal microbial protein. Because of this process, the dairy cow is uniquely capable of converting lower quality protein sources into high quality microbial protein that the cow can use to produce protein in milk. Changes in blood urea concentrations can be affected by the amount of dietary protein fed and by the efficiency with which rumen microbes convert rumen ammonia to microbial protein. Thus, monitoring bulk tank MUN concentrations offers the potential for dairy farmers, nutritionists, and veterinarians to evaluate ration protein nutrition. Feeding excess protein levels, especially of rumen degradable protein (RDP), may result in MUN concentrations above a normal concentration range. Other factors that can influence MUN concentrations include breed, stage of lactation, level of milk production, cow health, season of year, ration energy concentration, and feed intake.

Using Bulk Tank MUN Concentrations

Urea concentration in milk is very small as compared with milk fat and protein. MUN values are reported as milligrams urea/deciliter milk (mg/dl) and can range from 0.5 to 40 mg/dl. Summarizations of several published reports suggest MUN concentration should be between 12 and 16 mg/dl.

If MUN concentrations are greater than 16 mg/dl this may indicate that dietary protein is being used inefficiently. Concentrations of MUN lower than 12 mg/dl may indicate that ration protein levels may be too low to maximize ruminal fermentation and lactational performance. As discussed above, MUN is influenced by many factors. Tracking and graphing bulk tank MUN data for an individual herd as it becomes available from your milk cooperative or processor would be an effective approach to establish a MUN baseline over time. Attempting to use a single
Farm Records Data Entry— A Challenge with Rewards!

Maintaining accurate records is important to any business and studying information derived from data is a good way to evaluate progress toward established goals. There are a number of ways to maintain accurate and effective farm records and efficient data entry options can make the process less painful, hopefully fueling some good management decisions along the way.

G. William Robb
Extension Dairy Educator
West Central Michigan

Farm records are a valuable asset but data entry in many farms is a challenge because of the quantity of information involved. Today, the amount of data necessary to meet regulations and make better management decisions is continuously increasing. Good records require complete, accurate, and efficient data entry about individual cows, crops, expenses, employee hours, etc. If your records are complete, accurate, and up-to-date, a review can help evaluate progress toward established business goals. If your system lacks completeness or is not generating the right data summaries, though, it may be a good time to consider investing in your record systems to benefit your business.

Each year it seems that more record keeping is required. A partial list of records that are required on a dairy farm include: production records on cows, crops and other enterprises; reproduction and health records on cattle; business records including income and expenses for taxes and business analysis, payroll records for labor laws and tax deductions; and, environmental records of manure nutrient management. Relatively new records may include individual animal identification and agricultural product security and biosecurity.

Your business goals should include efficiently gathering and entering data so that you have useful, up-to-date farm records. On many farms the spouse traditionally has done the record keeping. Today many farm spouses work off the farm with little time left to work on farm records. Some farms may split up the tasks of data entry, with one partner or individual responsible for the financial records and another responsible for production, crop, and other records.

Using Data Entry Sheets

First, you need a system for employees and management to compile and organize information for entry into your record system. The old shoe box method of storing farm financial records is not seen very often today, yet a large pile of invoices is not an uncommon sight at the end of each month. The corn hybrid pocket notepad can still be a helpful tool. However, it may not be large enough to provide the categories for all the required information. A clipboard with the Michigan Agriculture Environmental Assurance Program record keeping sheet for manure applications (available at <http://www.maeap.org/>) may ensure that employees enter all needed information for a potential Michigan Department of Agriculture or Department of Environmental Quality complaint inspection. A health treatment record input form can be used to record individual cow treatments that are later recorded in your permanent file. Your paper and file system or prepared input sheets can be very helpful for employees and the person recording and entering data. Compare ideas with your neighbors for data sheets that work well for their farm.

Benchmarking

Other authors recommend key production indicators as benchmark goals to assist managing your dairy. When you identify these indicators for your farm you can define the data required. Benchmarks can be found at several university or DHIA web sites.

Two financial sources that may be useful are <http://cdp.wisc.edu/AgFA.htm> and <http://www.cffm.umn.edu/index.aspx>. Dairy production benchmark figures may be obtained from <http://www.drms.org/dairymetrics.html>.

An example of a key production indicator that requires data is the pregnancy rate in your herd. This is often recorded as a percent of cows that conceived against the number of cows with eligible estrous cycles over a period of time. This
History of a National Dairy Record System

Production records have been an important herd improvement tool for more than 100 years, with proven results. As the Dairy Herd Improvement Association system has assisted producers in culling, herd management, research and sire and cow proofs tremendous gains in production per cow, milk quality, and herd profits have been realized.

Ted Ferris
Dept. of Animal Science

In the years since the formation of the Newaygo Dairy Testing Association, the first Cow Testing Association (CTA) that started in America in the Fall of 1905, production records have become the foundation for herd improvement. This was noted in the early years by the fact that the name was changed nationally in 1927 to the Dairy Herd Improvement Association or DHIA. With computerization of herd records in the second half of the 20th Century, DHIA records became the vehicle for genetic improvement of dairy cattle in the US.

The First Association Summary

The first cow pages for CTAs were printed by the State of Michigan Dairy and Food Department in thick bound books and included recordings of pounds of milk and fat, percent butterfat, fat price, pounds of various roughages and grains fed, and feed prices. For each cow, the tester spent time computing values, including the total value of product (pound of fat times the price of fat), cost of grain and forage fed and total feed cost along with the cost to produce a pound of fat and the profit or loss each month for each cow in the herd. Interestingly, total milk solids were estimated from a lactometer reading and from this, solids-not-fat was computed that first year. The type of information to record was likely garnered from previous work in Denmark and US State Experiment Station efforts.

Much of the information on the 239 cows in the 31 Newaygo County herds is summarized in the first summary reported by the Michigan Dairy and Food Department in 1907 (4). This summary was probably done by Helmer Rabild, who worked for the Dairy and Food Department and helped start the Newaygo CTA. The production average that first year was 5,336 pounds of milk and 215 pounds of fat with a 4.04% butterfat test.

Feeding, Weeding, and Breeding

With the first set of herd averages, professionals began communicating the benefits of cow testing in countless newspaper articles in local newspapers and magazines. A dairy column in the Michigan Farmer often included related articles expounding the merits of feeding the better cows more and weeding out unprofitable cows. One of A.C. Baltzer’s articles on Why the Tester is Popular (5/2/1925), stated “From the experience of the Michigan cow testing association members it is clear that the joining of a cow testing association will mean much to the individual owner, for he will get the exact facts about each of his cows. He will feed more economically. He will be able to tell the breeding value of his sires through the records of their daughters. He will be able to create and establish values on the cows in his herd.”

The Role of the Cooperative Extension Service

A number of agencies helped to foster the DHIA dairy record system in the US. Before 1914, the Dairy Division of USDA, under the direction of Helmer Rabild, was the driving force behind the spread of cow testing associations nationally (1). In most states the organization and supervision of the program was under the direction or sponsorship of the state departments of agriculture (their predecessors) or the state agricultural colleges. Some colleges had extension faculty and departments even before 1914, when the Smith-Lever Act established the Cooperative Extension Service nationally. By then, CTAs were such a promising source of practical information that they became a key project for State Agriculture Extension Services (2). Faculty at land grant universities working with CTAs took on the title of Extension Dairyman. Their responsibilities included education, promoting testing, training cow testers, and publishing herd and state records. A.C. Baltzer had this role in the early 1920s at Michigan State College. In addition, County Agricultural Extension Agents worked directly with local cow testing associations, often playing a key role in the management of the associations, starting new associations, providing management advice to producers, and publishing herd and cow performance records in local newspapers.

Over time, Extension played a key role in coordinating DHIA efforts across states. In 1924, a national committee was established by State Extension Specialists under the American Dairy Science Association (ADSA) to develop a uniform set of rules and guidelines for CTAs. This committee recommended that the name “Dairy Herd Improvement Association” be used and that employees be called “DHIA Supervisors” (5). Cooperation between local CTAs, State Extension Services, dairy workers of USDA, and ADSA resulted in the development of a coordinated national cooperative DHIA program (2) with records collected nationally for use in management studies and genetic evaluations. F.J. Arnold noted that the early promoters saw the direct benefit to the producer but also that all dairymen would benefit from production and other data on herds (1). This realization provided the stimulus and justification for the time and effort devoted to the record system by the
15 Practices in Response to Johne’s Disease in Your Farm

Johne’s disease is a serious herd health problem affecting Michigan dairies. Dairy producers met during a recent Michigan State University Extension program and discussed the practices they use in response to Johne’s disease, even after recognizing its presence in their herds.

During the MSUE winter dairy program “Animal Health: Managing Diseases on your Dairy Farm” nine proactive dairy producers shared their experiences with Johne’s disease. Having diagnosed Johne’s disease in their farms, these producers chose to grab the bull by the horns. They recognized that Johne’s disease is a serious problem and put in place practices aimed at reducing the prevalence of the disease in their herds.

These producers came from different farm sizes and areas of Michigan. Yet all agreed that managing Johne’s disease in their herds was important and worth the time and effort. Some were managing the disease before it gained a major toehold in the herd while others were dealing with cows that showed clinical signs and higher cull rates and deaths. They realized the impact that Johne’s disease can have on herd profitability, overall health, and consumer confidence in their products. While each of these producers had implemented practices that matched their risks, goals, and abilities, some measures to control the disease were employed by almost all.

1. Providing individual calving pens.
2. Removing the calf from the dam within 1 hour of birth.
3. Not using colostrum from Johne’s infected or suspect dams for heifer calves.
4. Not feeding unpasteurized waste milk to calves.
5. Not using the same skid steer or tractor bucket to feed cattle and remove manure.
6. Separating young stock housing from adult cow housing.

In addition to controlling the disease itself, many producers are working to reduce the risk of Johne’s disease transmission.

7. Ending use of a cattle trailer to move calves on and between farms.
8. Ear notching calves born of positive dams to easily identify them as higher risk animals.
9. Halting spread of manure on alfalfa fields.
10. Separating bull calves from heifer calves if bull calves get colostrum or milk from Johne’s disease-positive cows.
11. Cleaning Johne’s disease-negative calving pens as often as possible.
12. Holding an annual meeting on Johne’s disease control for everyone who works with the farm livestock.
13. Using milk Enzyme-Linked Immunosorbent Assay (ELISA) on the last DHI test before dry off to help make more informed management decisions at calving.
14. Examining inseminated cows by ultrasound and culling Johne’s disease-positive cows if not pregnant or if carrying a bull calf.
15. No longer feeding waste feed from cow barn to heifers.

Johne’s disease is a serious herd health problem and potentially a public health concern. Dairy producers are encouraged to implement a Johne’s disease control and prevention program. The best way to do this is to work with your veterinarian by conducting a Johne’s risk assessment and then developing a farm plan based on the identified risks. For more information on Johne’s disease, visit <http://cvm.msu.edu/extension/johnes>.

Printing and distribution of Michigan Dairy Review is supported by a competitive grant from funds of the Michigan Animal Agriculture Initiative administered by MSU’s Animal Industry Coalition.
requires collecting a lot of data to then enter and calculate the appropriate figures for comparison. Quality data summarized and graphed for your key production indicators can be a huge help to monitor your success in the reproduction program.

Another example may be the incentive pay program for your employees to improve milk quality. To make the incentive meaningful, accurate data must be collected and reported so every employee sees the results of their efforts and understands their role in improving the herds’ somatic cell and bacteria counts.

Using Computers

All of these record needs can be made more efficient by the use of a computer. As the need for more records mount, the purchase of a computer makes more economic and time management sense. The problem then becomes the initial investment time to learn about the computer and software plus timely and accurate data entry.

Some Data Entry Options

Computer systems can have linked payroll or check writer software that automatically enters expenses in the accounting system. One such option is the Telfarm system offered through Michigan State University Extension’s Farm Information Resources Management Team (available at <http://www.canr.msu.edu/telfarm/>). Another option is to use a personal digital assistant (PDA) to synchronize the data to your computer. This saves you from entering data twice and can be done on the site of the management task. PCDART software (available at <http://www.drms.org/>) also has the ability to utilize radio frequency identification (RFID) to accurately scan tags and transfer information to the computer. Many other parlor systems have similar electronic equipment or will shortly.

Agribusiness consultants who work with your farm require data to help solve problems. A frustrating situation is the availability of little or no information to provide current status or long-term trend analysis. I am reminded of a dairy farm that had a severe calf disease problem. Several management and facility changes were implemented over a year, yet they struggled to clear up the problem. Several variables likely impacted the disease. Without records how do you know that your management changes are effective?

Ways to Get The Job Done

The problem still becomes accurate data entry. Larger farms often hire companies or secretaries to assist with the data entry for payroll, accounting and production record systems. Consider hiring someone for data entry on your farm, even if it is only a part-time employee, to free up critical management time for you. An employee could be shared between several farms needing the same accounting or data entry skills. Let’s admit it, your typing skills are likely not any better than mine!

Another way to make sure that data entry occurs on the farm is to enroll in programs that offer it as a service. DHIA comes to mind as the obvious program that assists in data entry by employees or technicians. The software available can calculate many common production, reproduction, and health measures and graph them for visual monitoring. If you are not presently using DHIA consider its record-keeping benefits worth the cost. With regularly scheduled testing, the data entry job gets done. In addition, you have access to your records and can generate many reports for cow management, vet checks, etc. Further, you and your consultants have access to software and records from other herds in the US to make management comparisons for benchmarking. One such resource is available at <http://www.drms.org/dairymetrics.html>.

Do you love doing paper work and record keeping? Likely not or you would have chosen another profession, such as an accountant. But you can consider a number of ways to make data entry on your farm less painful and more efficient. Review your farm’s prior year records for the strengths and weaknesses in your business. What key performance indicators do you need, and have you gathered the necessary data to monitor them? How can you more easily enter those data to provide information that will help you reach your goals? I hope you are successful in reviewing your record system, improving the efficiency of data entry, and the resulting monitoring of your progress.

Web Resources

Center for Farm Financial Management
http://www.cffm.umn.edu/index.aspx
Dairy Records Management Systems
Michigan Agriculture Environmental Assurance Program
http://www.maeap.org
Telfarm Microtel
http://www.canr.msu.edu/telfarm/
U. Wisc. Center for Dairy Profitability
http://cdp.wisc.edu/AgFA.htm
DHIA Continued from Page 8

early leaders.

The 1950s and 1960s brought statewide DHIA organizations with elected farmer boards. They hired statewide managers who began to take over the many tasks involved in running the DHIA record system. This change allowed Extension Dairymen to focus on educational efforts that involved using DHIA information for decision making and managing the dairy herd.

In 1950, computerization of DHIA records first occurred in Utah. In 1953, efforts began in Michigan when State Extension Dairy Specialist Larry Johnson and Pat Ralston of the Michigan State College Dairy Department hired Al Thelen to lead development of a centralized DHIA data processing program. Computerization eventually led to fast and more accurate transfer of records from state DHIA associations to USDA-AIPL (Animal Improvement Programs Laboratory) allowing for growth in national sire and cow genetic evaluation efforts.

Today, on-farm computerization allows farm managers to develop their own custom management reports that are generated daily and many carry cow data with them in hand held computers allowing them to look at a cow’s history or enter new information on the spot. Improved data handling has allowed the amount of information recorded on each cow to grow since 1905. Since 1905 we have added reproductive, health, genetic, and other data to the dairy records.

National Coordination Efforts

Discussions in the early 1960s resulted in two changes nationally. A national DHIA organization was outlined by three dairymen representing Michigan, Wisconsin, and North Carolina DHIA and three Extension Dairymen from Iowa, Michigan, and Wisconsin. This National DHIA, Inc. began October 5, 1965, with eight states as charter members – Wisconsin, Michigan, North Carolina, New York, Pennsylvania, Vermont, Virginia, and Washington (3,5).

In April 1966, the National Dairy Herd Improvement Coordinating Group was established, bringing together members representing the Agricultural Research Service, the Federal Extension Service, Regional Extension Dairymen, ADSA, the Purebred Dairy Cattle Association, National Association of Animal Breeders, and the newly formed National DHIA (3,5).

With the formation of National DHIA the responsibility to coordinate DHIA across states shifted to the dairy producers on a national level diminishing the need for Extension’s role and leadership of the DHIA program. Today DHIA, breed associations and the AI industry still work together as the Council of Dairy Cattle Breeding to oversee dairy records used in national genetic evaluations.

Summary

Recording of cow records started in earnest in the US in 1905. Today, Michigan herds produce 4.5 times the amount of milk as then. The 2004 state average for tested herds was 23,888 lb of milk, 884 lb of fat and 693 lb of protein valued at $3,504 per cow. Today, the percentage of cows on DHIA has grown to 46% nationally and Dairy Record Processing Centers provide a wide array of data and services to producers, consultants, AI organizations, USDA, and researchers.

In 1956 F. J. Arnold said, “From almost any point of view, the DHIA is an ideal result demonstration. The records provide a detailed study of the dairy enterprise on each member’s farm. The data thus obtained not only are valuable to the association member but also serve as basic information in educational meetings with other dairymen. Today, a large part of the husbandry extension work is founded on results of dairy herd improvement associations. Last but not least, thousands of dairymen have received production testing benefits through the medium of artificial insemination. Bull studs put a high premium on meritoriously proved sires, and every dairy farmer who breeds his cows artificially profits from it” (1).

The DHIA records system has been an indispensable cog in herd improvement providing records for culling, herd management decisions, research, and sire and cow proofs all leading to tremendous gains in production per cow, milk quality, and herd profits. Much progress resulted in the US dairy industry because of the DHIA system and the cooperative spirit that has evolved around it over the last century.

References
Energy Continued from Page 4

enough heat exchanger and fine-tuning ground water flow rates so that the water flowing through the plate is as cool as possible (1).

Fluid pumping system controllers such as VFDs and VSDs reduce energy use. Single speed drives operate at a constant 7 to 10 cubic feet per minute for each milking unit. A VSD responds by adjusting the motor speed to maintain a stable vacuum pressure. The VSD usually will allow use of a lower horsepower pump, which further reduces electrical consumption. Ten horsepower of excess motor capacity results in $400 to $600 per month of excess electricity costs (1). A similar savings is available for milk pumps, although VSDs are not recommended for some rotary vane pumps and water ring pumps (3, 5). Scroll compressors of equivalent horsepower (3 hp) use 42% less electricity (4) and centrifugal pumps are a recommended alternative (1). Payback for both options is usually less than 3 years.

Another study found that 70% of vacuum controllers were located improperly. Controllers need to be located as close to the cow as possible, usually near a sanitary trap. This location improves the efficiency of the vacuum control with corresponding energy savings (4). Lastly, leaks in the system cause the pumps to run longer than necessary. Automatic milking takeoffs provide the potential to save hundreds of dollars per year (10) and other advantages such as reduced labor, consistent end of milking time, and decreased worker movement.

Because a compressor system liberates a lot of waste heat, a heat recovery system attached to your compressors can pre-heat your water, thereby saving energy. The issue then is picking a system that has a reasonable payback period. Two technologies are available: desuperheating units and fully condensing units. Desuperheating units are less expensive, but the energy savings for condensing units are sufficient to show a 3 to 4 year payback period (1). Refrigeration heat recovery units also are available, but they usually are not used with plate coolers. The Ministry of Agriculture, Food and Rural Affairs in Ontario (6) adds a list of other considerations on heating water on farms.

- Link water heater to a timer to ensure water is not continuously heated unnecessarily.
- Purge 2 to 3 gallons twice yearly from the drain tank of the water heater.
- Convert to a high efficiency heater/boiler system.
- Insulate the water heater and the first 20 feet of pipe.

Lighting, at 24% of energy use, is also important (Figure 1). Another list from Ontario (8) also offers useful energy reduction solutions.

- Install and set timers, adjust photocells and motion sensors.
- Light work zones specifically, not the entire area.
- Design lighting systems for the correct light levels (16 to 20 hours of light per day over the cow stalls).
- Clean lamps and covers with detergent and water for best light delivery.
- Replace incandescent bulbs with compact fluorescent bulbs.
- Install fluorescent fixtures or convert from T-12 fluorescent tubes to T-8 tubes. T-5 tubes are more expensive without significant savings.
- Use high intensity discharge, high pressure sodium or metal halide lamps for the outdoors and ceilings over 12 feet high.
- Use light emitting diode (LED) lighting where appropriate.
- Use automatic dimmable level controllers where possible.
- Use energy efficient heat lamps or heat pads if needed.

Efficient fans can make a major contribution to energy savings in your operation (7). Fans, of course, are a necessary component of mechanical ventilation system to drive the air movement in animal housing. Testing of 36-inch fans by the Bioenvironmental and Structural Systems Laboratory at the University of Illinois found great variation in performance for flow and electricity use. Fans with roughly similar air flow (9000 to 9900 cubic feet minute) ranged from 8.4 to 18.6 cfm/watt. These efficiency differences are particularly important in mild and warm weather when fans are operating. This study found that more efficient fans cost $150 to $250 more, but because of electricity savings payback time was less than 2 years and resulted in a $1,900 savings over the 10-year potential life of the fan (9). Continuous flow fans may be needed to adequately move air, and if efficient fans are used they also can contribute to significant energy savings (9).

Though not dairy specific, there are some other agricultural efficiency opportunities worth considering (10).

- Livestock waterers— waterers with 2 inches of insulation and adjustable thermostats, no or low hydro units, solar, wind and ram pumps are options.
- Low–pressure irrigation systems— these reduced pressure systems deliver the water needed, but at a significant energy savings.
- Water Pumps — permanent soft-start motors are more
efficient.
- Other electrical motors—Place high efficiency motors sized to load in clean, cool, dry places and maintain motors, belts, pulleys. Covert V belts to toothed belts if possible.
- Electrical components—bad contacts waste energy and have fire hazard potential. Clean breaker panels, thermostats and fans.
- Tractor heater timers—A timer can have a payback of less than a year and still keep the block warm enough for easy turn over.
- Fencing—Utilize photovoltaic panels for power because they save labor and electricity costs.

If all of this seems daunting there are auditing specialists (check with your utility or rural energy cooperative) that can assist you with an evaluation of your operation. An auditor should be able to provide a list of recommendations and the savings that each of the upgrades can provide you. Qualifications and experience are extremely important for this task, so this is a good time to ask for references and examine previous efforts.

If you are interested in applying for USDA Farm Bill 9006 energy funding for efficiency projects, an audit is a requirement and more information is available from the USDA Rural Development offices on-line at <http://www.rurdev.usda.gov/rbs/farmbill/index.html>.

References

---

**Educational Programs**

**MSU Dairy Judging Program Well Represented in National Contests**

Joe Domecq  
Dept. of Animal Science

The members of the Michigan State University Collegiate and Ag Tech Dairy Judging Teams and over 25 Michigan 4-H and FFA members spent many summer and fall weekends visiting farms and judging cows in preparation for the 2005 judging season. The teams visited dairy farms in Michigan, Ohio, Indiana, Wisconsin, and Ontario, Canada. Practices were held at the Shiawassee County Fair and the Community Fair in Hudsonville, MI. The practice and hard work paid off as MSU had successful showings at three national contests.

The 2005 MSU Collegiate Dairy Judging Team members were Jennifer Ackerman (Vasser), Amber Black (Morley), Katy McCracken (Carson City), and Faye Vanderhoff (Clayton). The MSU Ag Tech Dairy Management Program was represented by Ryan Bentheim (McBain), Nathan Elzinga (Zeeland), Aubrey Lettinga (Wayland), and Mary Tenbrink (Coopersville).

The first contest of the year was at the Pennsylvania All-American Dairy Show in Harrisburg, PA on September 19. The MSU Collegiate Team and two Michigan 4-H teams participated in the contest. Michigan 4-H was represented by Lindsey Bowerman (Quincy), Gail Carpenter (Dansville),
Fertility

Continued from Page 5

This begged the question: Why hadn’t anyone examined the association of numbers of follicles growing during follicular waves with fertility, especially considering the relatively easy use of ultrasound to count follicles? I suspect the association of numbers of follicles with fertility hasn’t been examined in cattle for four reasons.

- The understanding that follicles grow in two or three different waves during a 21-day estrous cycle (Figure 1) is a relatively recent discovery.
- The long hours and money required to hire and train someone to use ultrasound to measure accurately alterations in numbers of follicles on ovaries during all the different waves of an estrous cycle in a relatively large group of cattle.
- Although dozens of follicles may grow during waves, cattle ovulate only a single dominant follicle (Figure 1). So, why would variation in numbers of follicles growing during a wave affect fertility when only one dominant follicle ovulates?
- Because follicular waves develop in quite different hormonal environments during the follicular and luteal phases of an estrous cycle, it is likely that numbers of follicles growing during the different waves of an estrous cycle are random rather than similar. If follicular growth is random during different waves, then it is unlikely to be very highly repeatable within individuals. Consequently, the predicted low repeatability of follicle numbers during waves would imply strongly that the potential heritability of this trait, like other female fertility traits, also would be low.

For all the aforementioned reasons, the potential use of numbers of follicles growing during follicular waves as a trait associated with fertility has not been studied, despite overwhelming scientific evidence from numerous laboratories that number of follicles is associated positively with fertility.

Pursley shared information from his thesis work at the University of Wisconsin. He had collected ultrasound data on separate follicular waves in several post-calving Holstein cows. The data showed that the variation in peak numbers of follicles during a wave was high among the cattle, but somewhat similar between the two waves within individuals. This information, albeit preliminary, was exciting to me because it was clearly contrary to some of the aforementioned reservations about follicle numbers during waves and fertility, especially the idea that follicular growth is random. Indeed, something simple to do like counting follicles, something contrary to scientific dogma, and something in my area of expertise with a potential positive association with fertility was all the motivation needed to start a new research project.

**Why hadn’t anyone examined the association of numbers of follicles growing during follicular waves with fertility?**

**Follicular Growth Variability**

David Burns, a graduate student in my laboratory, was trained by Pursley to use ultrasound to count follicles. A group of approximately 50 Holstein heifers and cows (lactating and non-lactating) were secured. These animals were used to view, count, and draw the location of follicles on each ovary onto maps.

Each animal in the study was injected with prostaglandin F2α (PG) to attempt to synchronize ovulation and initiate a new estrous cycle. After PG, each animal was subjected to twice daily ultrasound analysis, which continued until 2 to 3 days after the next ovulation. During each ultrasound session, Burns recorded number and size of all follicles equal to or greater than 3 mm in diameter on each ovary. Because some animals have two (usually cows) or three (usually heifers) waves, the scanning regimen was sufficient to analyze two to four follicular waves per animal. In total, 160 waves were analyzed.

Each cow was classified arbitrarily as having a low, intermediate, high, or very high average peak number of follicles counted during each follicular wave. The results demonstrated clearly the high variation of follicle numbers during waves among cows but surprisingly little variation in peak number of follicles within individuals. Indeed, after statistical analysis of all 160 waves in heifers and cows, the overall variation in peak numbers of follicles per wave among animals was very high (8 to 56 follicles per wave) while repeatability of peak numbers per wave within individuals was a remarkable 0.95 (1 is perfect). My research associate Fermin Jimenez-Krassel conducted a similar project with different animals to be sure Burns’s results were repeatable. Much to our delight Jimenez-Krassel’s ultrasound studies produced results nearly identical to Burns’s. Moreover, another follow-up study conducted in Ireland last year at the University College Dublin by Alex Evans, Pat Lognegan and Fabian Ward generated results in beef heifers nearly identical to those produced by Burns and Jimenez-Krassel in dairy cattle. Three different studies in two different breeds of cattle conducted by three different ultrasound technicians in two different countries strengthens confidence in the results.

**Potential Importance to the Dairy Industry**

The high variation of follicle numbers during follicular
waves among animals and repeatability within individuals means that cattle can be reliably classified based on numbers of follicles growing during ovarian follicular waves. For example, ultrasound can be used to identify cows that consistently have either low or very high numbers of follicles growing during their follicular waves.

I indicated earlier in this article that total numbers of follicles are associated positively with fertility in a variety of species including cattle. Because the variation in numbers of follicles growing during follicular waves can be measured, it is possible to firmly establish in field trials if cows with high numbers of follicles growing during waves are more fertile than cows with low numbers.

Our new way to evaluate cattle could have important genetic implications. For example, if number of follicles growing during waves is genetically regulated, then the very high variation in numbers of follicles growing during waves among animals and very high repeatability within individuals implies that substantial genetic progress could be made with traditional animal breeding programs.

However, I don’t want to put the cart before the horse. Whether our relatively simple new way to evaluate cattle can ever be used in animal breeding schemes to improve fertility, or lead to development of new technologies to improve reproductive efficiency remains to be seen. We are at work answering this question and will share our new results with you soon.

Judging

Jessica Fry (Blanchard), and Kendra Stieg (Hersey). A second Michigan 4-H team, whose members were all also in FFA, competed in the FFA division of the contest to gain additional experience. Team members included Emily Butcher (Corunna), Ashley Messing (Bad Axe), and Bill Shuler (Baroda).

The Collegiate Team placed 3rd in Brown Swiss, 2nd in linear evaluation, and 10th overall. Individually, Katy was 5th in Brown Swiss and 3rd in Holsteins, and Amber was 3rd in linear evaluation. The Michigan 4-H Team placed 1st in Brown Swiss, Holsteins, linear evaluation, and oral reasons. They were also 4th in Jerseys and 4th overall in a very close contest. Lindsey was 4th in Holsteins, 3rd in linear evaluation, and 1st in Jerseys. Gail had an outstanding day placing 1st in Brown Swiss, Holsteins, linear evaluation, and oral reasons and 4th in Ayrshires. Gail was 3rd high individual overall in the contest. In the FFA division, the Michigan team was 5th in Ayrshires, 3rd in Brown Swiss and oral reasons, 2nd in Guernseys and Jerseys, and 1st in linear evaluation. Overall, the team placed 2nd in the contest. Bill was 2nd in linear evaluation. Emily placed 2nd in Guernseys, 4th in Jerseys, and 5th overall. Ashley was 3rd in Brown Swiss, 5th in oral reasons, 1st in linear evaluation, and 4th overall.

The Michigan 4-H teams are selected from the top 25 individuals at the state judging contest held during Michigan Dairy Expo in July. These individuals are invited to participate in several workouts during August, and the teams for each contest are selected at the end of August. All 4-H youth are invited and encouraged to participate in the contest at Michigan Dairy Expo and try-out for one of the national teams. The Collegiate and Ag Tech team members are selected from students at Michigan State University who have completed a judging course and have been part of the judging program during their education at MSU.

ABS Global, Michigan Dairy Memorial Foundation, Michigan FFA Alumni Association, Michigan Holstein Association, Michigan Milk Producers Association, Northstar, Inc., and the United Dairy Industry of Michigan provide major financial support to the MSU Dairy Judging Program. Team members also participate in fund raisers throughout the year, including the Spartan Spectacular Calf Sale held every March.

The MSU Dairy Judging Program would like to extend appreciation to all of the individuals, farms, and agricultural businesses that support the program by providing cattle, expertise, and financial support. Special thanks go to Mrs. Sara Long and Mrs. Renee McCauley, who traveled with the teams to various contests and workouts this fall, and to Ms. Karolyn Terpstra and Ms. Beth Munsell, graduate students in the College of Agriculture and Natural Resources, who provided coaching assistance. The MSU Dairy Judging Program is coordinated by Dr. Joe Domecq.

Interested in being on an advisory committee for the Michigan Dairy Review?
Send an email to: mdr@msu.edu
or contact: Jake McCarthy
2265 Anthony Hall, Michigan State University, East Lansing, MI 517-353-4570
mccar244@msu.edu
Secure Dangerous Chemicals in the Farm

Dean Ross
Extension Dairy Educator
Southeast Michigan

Millions of tons of farm chemicals are used annually in the United States, often with little concern for the potential for poisoning or misuse related to accidental, criminal or terrorist activities. Security considerations for these chemicals are important and should be on your radar screen. Planning is important in preventing or dealing with theft, loss or accidental spill of chemicals. Consider the following to enhance security in your farm.

Security for Bulk Storage and Holding Tanks.
Secure bulk storage with locks and secondary security fencing. Additional deterrents include dogs and electronic security such as alarms and video monitoring. Surround bulk storage with a secondary containment system to prevent the further spreading of minor spills or catastrophic discharges.
Secure chemical and fertilizer transport tanks and equipment when left in the field. Do not leave them isolated and close to the road. Notify local police when leaving chemicals in the field. Provide portable spill containment materials for use in the field. Train employees in spill containment. Label storage appropriately. Signs should have emergency contact information.

Security of Storage Facilities.
Ensure chemical storage facilities are locked when not in use and maintain a current inventory of hazardous chemicals and pesticides. Modify the inventory as materials are used. Store this inventory or a duplicate outside the storage area in case of emergency or fire. Good records should include chemical name, active ingredient, date of purchase, location and volume stored. Good inventory management will help reduce costs by minimizing the amount of expensive chemicals on hand at any one time.

Keeping storage areas neat and organized increases the ability to detect theft and tampering. Broken locks, doors and windows will be more quickly and easily identified should theft or vandalism take place.

MSU Extension Bulletin E-2335, On-Farm Agrichemical Storage & Handling provides more information on this topic. It can be purchased at your county Extension office or from the MSU Bulletin office at <http://www.emdc.msue.msu.edu>.

Reference
Sections adapted from Virginia Cooperative Extension Publication 445-005 July 2002. Original authors: Scott Hagood and Pat Hipkins.

MUN Continued from Page 6

test result or only a few MUN values to make ration changes could result in making incorrect ration formulation decisions. After monitoring bulk tank MUN over a period of time, if MUN concentrations are not within the suggested normal ranges of 12 to 16 mg/dl, the possible factors that may be influencing MUN concentrations should be evaluated. Collecting MUN data from individual cows or groups of cows can help pinpoint potential problems to make more informed ration formulation decisions.

Summary
Bulk tank MUN data may be a useful tool to assist in monitoring the feeding program and perhaps to relate to excessive nitrogen excretion in manure. Remember bulk tank MUN concentration represents the milk from all of the lactating cows and thus is only a gross evaluation. Individual cow or management group MUN concentrations are required to pinpoint where high or low MUN concentrations are occurring and if adjustments in protein nutrition are warranted in one or more cow groups in the herd.
Dairy Awards

Miriam Weber Nielsen Named MSU Scholar Teacher

Miriam Weber Nielsen was awarded the Teacher-Scholar Award at Michigan State University’s annual Awards Convocation ceremony February 9. Teacher-Scholar Awards are presented to six faculty members who have earned the respect of students and colleagues for their devotion to and skill in teaching. The purpose of the award is to recognize the best teachers who have served at MSU for 7 years or less.

Weber Nielsen is the originator of The Dairy Challenge, a unique experiential learning experience for undergraduate majors that builds evaluation and team skills as teams of students assess dairy farm businesses. Together with national dairy industry leaders, she developed the annual North American Intercollegiate Dairy Challenge in which over 20 universities participate. Through this and other initiatives, she has increased visibility of the undergraduate dairy program, connected undergraduates with the research, teaching, and extension dairy faculty, and facilitated the creation of teaching-related publications and grants.

With grant support from federal and industry sources and collaborating with other faculty in her Department, Weber Nielsen’s research program applies fundamental studies of the biology of mammary gland development to practical challenges faced by the dairy industry. Recent studies have focused on the influences of growth rate and nutritional factors on mammary growth in prepubertal heifers.

Weber Nielsen also received the 2003 Outstanding Young Teacher Award from the Midwest Section of the American Dairy Science Association/American Society of Animal Science.

Kathy Lee Receives MMPA Award

The Michigan Milk Producers Association Evart Local of district 5 recognized Michigan State University Extension Dairy Educator Kathy Lee for her service to agriculture at the MMPA annual meeting on Jan. 19.

Lee has been an MSU Extension Dairy Educator for 10 years. She currently serves 14 counties in northwest lower Michigan. She earned her bachelor’s of science degree from Michigan State University, her master’s of science degree from Virginia Tech and doctoral degree from Iowa State University. In addition to assisting dairy farmers and presenting local educational programs she participates as an instructor in the statewide dairy programs for the MSUE Dairy Team.

Lee serves on a Dairy Herd Improvement Association advisory committee for NorthStar Cooperative and works with many dairies to better implement PCDART dairy management software. She works closely with the MSUE Farm Information Resource Management team and edits Michigan Dairy Review.

Mike Allen Receives Distinguished Faculty Award

Michael S. Allen was presented with a Michigan State University Distinguished Faculty award February 9 in light of his significant accomplishments in research and extension that have left an indelible mark on the nutritional sciences and feeding of ruminant animals worldwide. Distinguished Faculty Awards are made annually to MSU faculty and librarians recognize outstanding service to the University. Nominations are based on research, teaching, publications, public service and extension and other accomplishments.

Allen was recognized for his ability to construct insightful hypotheses and his drive to conduct well-planned experiments. Outcomes of his research efforts are delivered in high impact, broadly based extension efforts that positively affect the productivity of ruminants and the standard of living of farmers, nutrition professionals, and consumers nationally and internationally.

Evidence of his teaching skill and high-profile research, Allen has worked with four MSU Distinguished Graduate Fellows simultaneously and his graduate students have received 27 awards, honors, and fellowships while at MSU.
Over $74,000 Awarded to Students with Dairy Interests

Miriam Weber Nielsen
Dept. of Animal Science

Students with a dairy interest continue to benefit from tremendous scholarship support at Michigan State University. This year, over $74,000 was awarded to 27 incoming and current students planning to pursue careers related to the dairy industry. Scholarships are provided by the Michigan Dairy Memorial and Scholarship Foundation, Inc. and the Howard Cowles estate.

The Michigan Dairy Memorial and Scholarship Foundation has honored 144 dairy leaders in Michigan since its establishment in 1957. To date, over 350 MSU students have received scholarships from the Foundation. In 2005-2006, scholarships were awarded to the individuals listed below on the basis of academic merit, extracurricular activities, and professional goals.

Freshman Scholarships ($1,500)

Greta Koebel, a freshman in Agribusiness Management, is involved on her family’s dairy farm in Three Oaks. In addition, she participated extensively in FFA, 4-H, dairy cattle judging, and Junior Holstein and Junior Jersey Associations. Greta plans to own a dairy farm or work for a dairy industry company after graduation.

Michael Schrader grew up on a family dairy farm in St. Johns. A freshman in the Ag Tech Dairy Management Program, Michael participated in 4-H for 11 years and Habitat for Humanity, and is a member of the MSU Dairy Club. Michael plans to own or manage a dairy farm after graduation.

Nikki Shaw, a freshman in Pre-Veterinary Medicine from Litchfield, is planning a career as a large-animal veterinarian. Nikki works for a veterinary clinic focusing on large animals. In addition, she participated extensively in 4-H, and is a member of the Pre-Veterinary Medicine Association at MSU.

Derek Lucas, a freshman in the Ag Tech Dairy Management Program, plans to return to the family dairy farm in Posen after graduation. Derek has been active in 4-H, FFA, and the Michigan Holstein Association, and is a member of the MSU Dairy Club.

Lyndsay Stakenas from Freesoil is a freshman in the Pre-Veterinary Medicine program. She grew up on a family dairy farm and participated in 4-H and athletics during high school. Lyndsay is planning a career as a veterinarian focusing on production animals.

Ag Tech Scholarships ($2,000)

Adam Preston from Quincy is a freshman in the Ag Tech Dairy Management Program. Adam grew up and works on a family dairy farm. In addition, Adam has been extensively involved in FFA, 4-H and dairy cattle judging, and is a member of the MSU Dairy Club. Adam plans eventually to return to his family’s farm.

Dave Bateman is a sophomore in the Ag Tech Dairy Management Program from Portland. He works as a herdsman on a dairy farm, and plans to return to the farm after graduation. Dave is a member of the U.S. Marine Reserves and served in Iraq prior to coming to MSU.

Ashley Messing, a freshman in the Ag Tech Dairy Management Program, grew up on a dairy farm in Bad Axe. She participated extensively in 4-H, FFA and high school athletics, and served as the Huron County Bean Queen. After graduation, Ashley plans to work in the dairy industry as a herd owner.

Brandon Falkner from Romeo is a freshman in the Ag Tech Dairy Management Program. He grew up on a family farm that included dairy cows as well as turkeys, hogs, and chickens. He participated in 4-H, Boy Scouts and high school wrestling. After graduation, Brandon plans to return to the family farm.

Nathan Elzinga is a sophomore in the Ag Tech Dairy Management Program from Zeeland. He grew up on a family dairy farm where he is extensively involved, and plans to return to the farm after graduation. Nate is a member of the Ag Tech dairy cattle judging team.

Dairy Memorial Scholarships ($3,500)

Holly Boyle is a junior in Animal Science from Yale. Holly developed her interest in dairy cattle while working for 2 years on a dairy farm and plans to become a large-animal veterinarian. Holly participates in 4-H and helps care for her family’s beef cattle.

Edward Costigan from Lansing is a junior in Crop and Soil Sciences. Ed developed his interest in agriculture while helping on his cousin’s dairy farm, and plans a career in the dairy industry that utilizes knowledge gained from agronomy and animal science courses. Ed is actively involved in Dairy Club, Agronomy Club, and FarmHouse Fraternity.

Amy Garrison from Onsted is a junior in Agriscience who is planning a career in agricultural communications. Amy grew up on a cow-calf and cash crop farm. She works in the MSU Meats Lab and participates in Dairy Club, Block and Bridle Club, and as a CANR Ambassador.

Joann Greenfield is a junior in Animal Science from Annapolis, MD planning a career as a veterinarian. Joann developed her interest in dairy cattle while helping on a relative’s dairy farm. She works at the MSU Dairy Farm and
<table>
<thead>
<tr>
<th>Name</th>
<th>College/Course</th>
<th>Activities</th>
<th>Future Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jennifer Venlet</td>
<td>Animal Science</td>
<td>Pre-Veterinary Medical As&lt;br&gt;Dairy Challenge contests.</td>
<td>Working for a dairy nutrition company.</td>
</tr>
<tr>
<td>Joe Tarkowski</td>
<td>Animal Science</td>
<td>Dairy Club&lt;br&gt;Dairy Management.</td>
<td>Plans to work as a herdsman manager or a dairy consultant after graduation.</td>
</tr>
<tr>
<td>Matt Fabus</td>
<td>Crop and Soil Sciences</td>
<td>Dairy Club&lt;br&gt;4-H&lt;br&gt;Ag Tech Management&lt;br&gt;Agricultural Education Club&lt;br&gt;FFA</td>
<td>Work as a herd manager or dairy consultant.</td>
</tr>
<tr>
<td>Scott Ruggles</td>
<td>Agribusiness Management</td>
<td>Dairy Club&lt;br&gt;Dairy Challenge&lt;br&gt;Dairy Association and Sigma Alpha.</td>
<td>Plans to work as a herd manager or dairy consultant.</td>
</tr>
<tr>
<td>Katy McCracken</td>
<td>Animal Science</td>
<td>Dairy Club&lt;br&gt;MSU Dairy Challenge.</td>
<td>Plans to work in the dairy industry after graduation.</td>
</tr>
<tr>
<td>Garrett Landel</td>
<td>Animal Science</td>
<td>Dairy Club&lt;br&gt;MSU Dairy Challenge.</td>
<td>Plans to work in the dairy industry after graduation.</td>
</tr>
<tr>
<td>Maria Johnson</td>
<td>Agribusiness Management</td>
<td>Dairy Plant&lt;br&gt;Pharmaceutical sales.</td>
<td>Plans to work in the dairy industry after graduation.</td>
</tr>
<tr>
<td>Colleen Jackson</td>
<td>Animal Science</td>
<td>Dairy Club&lt;br&gt;London Collegiate Choir&lt;br&gt;Dairy Club&lt;br&gt;Dairy Challenge.</td>
<td>Plans to return to the family farm after graduation.</td>
</tr>
<tr>
<td>Alysa Isley</td>
<td>Agriscience</td>
<td>Dairy Club&lt;br&gt;FFA&lt;br&gt;Agricultural Education Club.</td>
<td>Plans to continue working in the dairy industry after graduation.</td>
</tr>
<tr>
<td>John Johns</td>
<td>Crop and Soil Sciences</td>
<td>Dairy Club&lt;br&gt;Agronomy Club&lt;br&gt;Barnes Scholarship.</td>
<td>Plans to return to the family farm after graduation.</td>
</tr>
<tr>
<td>Mitch Fabus</td>
<td>Crop and Soil Sciences</td>
<td>Dairy Club&lt;br&gt;Agronomy Club&lt;br&gt;Howard Cowles Dairy Scholarships.</td>
<td>Plans to return to the family farm after graduation.</td>
</tr>
<tr>
<td>Chris Creguer</td>
<td>Animal Science</td>
<td>Dairy Club&lt;br&gt;MSU Dairy Challenge.</td>
<td>Plans to return to the family farm after graduation.</td>
</tr>
<tr>
<td>Jesse Chase</td>
<td>Agribusiness Management</td>
<td>Dairy Management Program.</td>
<td>Plans to return to the family farm after graduation.</td>
</tr>
<tr>
<td>Sara Brindley</td>
<td>Animal Science</td>
<td>Dairy Club&lt;br&gt;Dairy Challenge&lt;br&gt;Jack &amp; Betty Barnes International Michigan Dairy Memorial Endowed Scholarship ($1,000)</td>
<td>Plans to return to the family farm after graduation.</td>
</tr>
<tr>
<td>Mitch Chase</td>
<td>Agribusiness Management</td>
<td>Dairy Management Program.</td>
<td>Plans to return to the family farm after graduation.</td>
</tr>
</tbody>
</table>

**Glenn and Anne Lake Scholarship**

The Glenn and Anne Lake Scholarship covers all tuition and fees for an academic year. The recipient is Chris Creguer, a senior in Animal Science from Caseville. Chris developed his interest in the dairy industry while working as a herdsman on a dairy farm in high school. He plans to work as a herd manager or a dairy consultant after graduation, while working toward becoming a partner in an existing dairy farm. Chris participates in FFA, FarmHouse Fraternity, Agronomy Club, Dairy Club, and Alpha Zeta, and has participated in the MSU, Midwest and national Dairy Challenge contests.

**Russel Erickson Scholarship**

The Russel Erickson Scholarship of $5,000 is awarded to Mitch Fabus, a senior in Crop and Soil Sciences from St. Johns. Mitch grew up on a dairy farm where he continues to be involved, and worked after high school on a custom harvesting crew in the West. Mitch works at MSU Crop & Soil Sciences farm and plans to return to his family’s farm after graduation.

**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 Jesse Chase, a junior in Agribusiness Management from Hastings and a graduate of the Ag Tech Dairy Management Program. Jesse participated in a study abroad program in Australia in summer 2005. Jesse is active in FarmHouse Fraternity and Dairy Club, and plans to return to his family’s farm after graduation.

**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 recipient of a $1,000 scholarship was Sara Brindley. A senior in Animal Science from West Branch, Sara participates in the Dairy Club. She plans to return to the family farm after graduation.

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 at 517-432-5443 or msw@msu.edu.
Michigan Milk Market Update

Christopher Wolf
Dept. of Agricultural Economics

With 2004 and 2005 providing outstanding farm milk prices, albeit with higher energy and feed prices in some periods, market signals encouraged increased milk production and both cow numbers and milk production per cow responded. Mailbox milk prices in Michigan for 2005 averaged $15.43 per hundredweight—about a dollar less than the all time nominal price record of 2004. After peaking at 313,000 cows in July and August there were 312,000 milk cows in Michigan as of December 2005 up 5,000 from a year earlier. Milk per cow climbed to 21,656 pounds per cow and total state milk production was up 6.4 percent from 2004.

Most of the other major dairy states also had robust growth in milk production in 2005. California and Idaho each added 30,000 cows to its milk herd in 2005 and the US as a whole finished the year up a net 39,000 cows (Figure 1). The increase in herd size happened despite the Cooperatives Working Together (CWT) program which removed 64,050 cows in October and November. The national herd is poised to grow further if the market warrants as the January milk cow inventory report showed about 4.3 million dairy replacement heifers, up about 4 percent from a year earlier. The ratio of replacement heifers to milk cows was more than 47 percent, a record level.

The large production increases have led to concerns about the degree to which supply will swamp demand in the coming year. Since the beginning of 2006, Class III milk prices have declined to reflect these concerns. At the end of January, the Class III futures offered an average price of $12.69/cwt for 2006 and USDA was forecasting average 2006 Class III prices between $11.80 and $13.10/cwt. As of March 3, 2006, the Class III prices for 2006 averaged $11.44/cwt for the remaining 10 months of 2006 (with January at $13.39 and February at

Figure 1. US and Michigan milk cow numbers, 2002-2005.
$12.20/cwt already on the books). USDA has similarly lowered their forecast now to between $11.65 and $12.70/cwt.

Cooperatives Working Together has removed herds each of the last 3 years and offered export subsidies on butter and cheese. These export subsidies have largely not been needed with high domestic and world dairy product prices and a weaker US dollar. This year, however, it appears that the export subsidies will be heavily utilized.

On the policy front, the Milk Income Loss Contract (MILC) payments were renewed for 2 years retroactive to October 2005 (the beginning of the government fiscal year). The rate was set lower than the previous 45 percent level at 34 percent of the difference between the higher of the advance Class III or Class IV price and $13.69/cwt. Payments from December 2005 through April 2006 are known while the rest can be forecasted using futures prices (Table 1). The forecasts are useful if your milk production will exceed 2.4 million pounds annually as that is the payment limit. At this time, the highest payments are forecasted during the Spring flush. Sign-up is required and is occurring at your local USDA Farm Services Agency office.

Other policy happenings include hearings on the “make allowance” for Class III and IV milk. The current proposal is to increase the make allowance to reflect increased manufacturing costs such as higher energy prices. The make allowance refers to the amount of the wholesale product (e.g., cheese or butter) price that is the manufacturing cost. This amount is subtracted from the wholesale price to get the milk cost portion of the product that is passed back to farmers. Thus, when the make allowance increases, the portion that is paid to raw milk declines. The current proposal from the dairy cooperatives is to increase Classes III and IV but not Classes I and II. The results of this discussion will directly impact farm milk prices.

### Table 1. MILC payments (December 2005-April 2006) and forecasts (May-December 2006).

<table>
<thead>
<tr>
<th>Month</th>
<th>Class I mover ($/cwt)¹</th>
<th>Class III futures price</th>
<th>Class IV futures price</th>
<th>MILC payment ($/cwt)²</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 2005</td>
<td>13.57</td>
<td>---</td>
<td>---</td>
<td>.0408</td>
</tr>
<tr>
<td>January 2006</td>
<td>13.38</td>
<td>---</td>
<td>---</td>
<td>.1054</td>
</tr>
<tr>
<td>February 2006</td>
<td>13.38</td>
<td>---</td>
<td>---</td>
<td>.1054</td>
</tr>
<tr>
<td>March 2006</td>
<td>12.49</td>
<td>---</td>
<td>---</td>
<td>.4080</td>
</tr>
<tr>
<td>April 2006</td>
<td>11.22</td>
<td>---</td>
<td>---</td>
<td>.8398</td>
</tr>
<tr>
<td>May 2006</td>
<td>---</td>
<td>10.85</td>
<td>11.00</td>
<td>.9146</td>
</tr>
<tr>
<td>June 2006</td>
<td>---</td>
<td>10.97</td>
<td>10.90</td>
<td>.9248</td>
</tr>
<tr>
<td>July 2006</td>
<td>---</td>
<td>11.30</td>
<td>11.30</td>
<td>.8126</td>
</tr>
<tr>
<td>August 2006</td>
<td>---</td>
<td>11.73</td>
<td>11.40</td>
<td>.6664</td>
</tr>
<tr>
<td>September 2006</td>
<td>---</td>
<td>11.87</td>
<td>11.60</td>
<td>.6188</td>
</tr>
<tr>
<td>October 2006</td>
<td>---</td>
<td>11.86</td>
<td>11.75</td>
<td>.6222</td>
</tr>
<tr>
<td>November 2006</td>
<td>---</td>
<td>11.71</td>
<td>11.55</td>
<td>.6732</td>
</tr>
<tr>
<td>December 2006</td>
<td>---</td>
<td>11.76</td>
<td>---</td>
<td>.6562</td>
</tr>
</tbody>
</table>

¹ Class I mover is the higher of Class III or Class IV prices. Class III is generally the relevant price.
² The MILC payment rate is set through April of 2006. The remaining months are forecasts using the higher of Class III or Class IV futures price as of March 30, 2006.

Large production increases have led to concerns about the degree to which supply will swamp demand in the coming year.
Alumni Profile

MSU Grad Arens Juggles Two Careers

Pam Jahnke
Dept. of Animal Science

Although maintaining two careers within the state’s dairy industry while raising a young family is a 24/7 kind of lifestyle, Andrew Arens wouldn’t have it any other way.

“I’ve always liked animals – especially dairy – and I’ve always liked working with other farmers and learning from them. My favorite part of the dairy farm has been the nutrition aspect,” Arens said.

Arens, 27, is a Westphalia dairy heifer grower and an area manager for Agri-King, a nutrition and forage quality consulting company based in Fulton, Ill. He completed the Michigan State University 2-year Agricultural Technology program in dairy management in 1997 with a focus on dairy nutrition and herd management.

He said the blending of two careers made sense given his agricultural background and his strong interest in nutrition management, even prior to attending MSU.

“I knew at the time I wanted to be in the dairy industry and I wanted to be a dairy farmer.” He had heard positive reviews about the agricultural technology program from former students and MSU Department of Animal Science professors.

While fulfilling the program’s internship requirement at an area farm Arens met an Agri-King representative. He said the company’s dairy nutritionist was always “looking hard at forages and at ways to improve forage quality.” Two years later he was hired by Agri-King.

As a dairy nutritionist, he serves farmers in part of Clinton and all of Ionia and Montcalm Counties. His clients’ herds range from 50 to more than 2,000 cows. His favorite part of the job is brainstorming with farm management teams—working with the veterinarian, herdsperson, and herd owner to develop a strategic plan for the farm.

“There is nothing more gratifying than when the farm reaches its goal and we have to raise the bar and set new goals. That is what gets me excited,” he said. Arens is also a strong promoter of the “feed efficiency” concept and is satisfied that it is receiving more attention in the dairy industry now than in the past. He defines feed efficiency as the amount of milk produced by one pound of ration dry matter consumed.

“I believe that with being aggressive and trying different things we can help progress the dairy industry,” Arens said.

Arens said the practical knowledge he learned from the agricultural technology program has been useful in his line of work.

“...
Calendar of Events
April - June

**Tri-State Dairy Nutrition Conference**
April 25-26, 2006
Grand Wayne Center
Ft. Wayne, IN
Contact: Herb Bucholtz, 517-355-8432, bucholtz@msu.edu

**62nd Michigan Dairy Industry Conference**
“Quality Products, Changing Environment.”
May 10, 2006
Sheraton Inn
Lansing
Contact: 517-373-9741, blondes@michigan.gov

**MSU Clean-in-Place (CIP) Short Course**
June 6-7, 2006
Dept. of Food Science & Human Nutrition, Michigan State University,
East Lansing
Contact: 517-355-8474  x114.

2006 Great Lakes Manure Handling Expo
July 27, 2006, 8am-5pm
Berlyn Acres
Fowler
Contact: 989-224-5240
www.rootzone.msu.edu
Michigan Dairy Review

Volume 11 Number 2


Editor ................................................................................ Dr. H. Allen Tucker
Final Copy Editor ................................................................. Dr. Kathy Lee
Managing Editor ............................................................... Jacob McCarthy
Publisher ........................................................................ Dr. David K. Beede
Circulation ........................................................................ 6,500

Permission to reprint or translate and reprint from Michigan Dairy Review is granted provided that the intended meaning is not changed and that explicit credit is given to the authors and publication source. If the original article is adapted, paraphrased, or changed in any other way please send facsimile (517-432-0147) of the new version to the Publisher for verification of meaning and approval. As a courtesy, please send a copy of the reprinted article to the Publisher (Dr. David Beede, Michigan State University, Department of Animal Science, 2265K Anthony Hall, East Lansing, MI 48824-1225). Product and service names are used only for the sake of clarity and in no way imply endorsement over similar products or services which may be just as effective. MSU is an Affirmative-Action Equal-Opportunity Institution. MSU Extension programs and materials are open to all without regard to race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, marital status or family status.

Printing and distribution of Michigan Dairy Review is supported by a competitive grant from funds of the Michigan Animal Agriculture Initiative administered by MSU’s Animal Industry Coalition.