Introduction

Do you need quick access to current weather conditions, historical weather data, or future forecasts? Do you know where to find current degree-day accumulations, predictions on when to cut alfalfa and recommendations on when to irrigate corn or soybeans? You can find this, and much more, from MSU’s Enviro-weather Program (www.enviroweather.msu.edu).

Enviro-weather collects data continuously from a network of local stations throughout Michigan. Stations transmit data regularly (every 30 minutes during the growing season) to a central server on campus. The information is processed and used to produce summaries, predictions and decision-making tools for agricultural producers, natural resource managers, and other Michiganders whose businesses and lives are influenced by the weather.

Enviro-weather Data Inputs

A network of 64 weather stations is the backbone of Enviro-weather. Each station has identical sensors that measure standard weather observations (air temperature, relative humidity, wind speed and direction, and rainfall) along with sensors that measure conditions specifically of agricultural interest (solar radiation, soil temperature at 2 inches and 4 inches, soil moisture at 12 inches and 24 inches, and leaf wetness). All stations are installed and positioned so they gather weather data representative of the area.

Station maintenance and sensor calibration is a priority for Enviro-weather, since the accuracy of the data depends on station maintenance. The Enviro-weather website (www.enviroweather.msu.edu) pro-

“The information on Enviro-weather is processed and used to produce summaries, predictions and decision-making tools for agricultural producers (including dairy farmers), natural resource managers, and others whose businesses and lives are influenced by the weather ...”

In This Issue...

Weather Data from Enviro-weather Program -- 1
Time Management for Dairy Cows ------------ 4
New Responsibilities Announced ----------- 6
Study Abroad to Belgium & Holland -------- 7
Food Animal Vets Are Coming -------------- 8
NMC Meeting -- September 8-9 -------------- 9
Winter Dairy Program - 2010 --------------- 10
Proactive Farm Management ---------------- 12
Protect Your Herd from Chemical Residues --- 13
Elimination of Johne’s Disease ----------- 14
Capturing Land-applied Manure ----------- 16
KBS Dairy Gets LEED Certification ------- 18
Spartan Dairy 3.0 Is Ready ---------------- 21
Michigan Milk Market Update -------------- 22
vides users with decision-making tools and weather information (current, historical, and forecasts) produced from data collected by local weather stations and National Weather Service stations and forecasts.

**What can Enviro-weather Offer to Dairy Producers?**
Provided are an alfalfa cutting model (predicts optimal timing for first alfalfa cutting), an alfalfa weevil development model (predicts feeding damage from alfalfa weevil), a water-use tool for corn and soybeans (determines when irrigation is needed), maps of Michigan showing degree-day accumulation ([base 50] to date and in comparison with “normal”), rainfall and temperature summaries and forecasts, and much more.

**Put It to Use**
To access the Enviro-weather home page, type “www.enviroweather.msu.edu” into your web browser. You will see a map of Michigan with Enviro-weather stations shown as dots. Move your mouse pointer over each dot to display current weather information for that station.

To see more detailed weather information and summaries for a station, click the station dot. The “Station Page” opens (see Figure 1) and gives you access to “Weather Observations and Summaries” tools. The “Soil Conditions” tool displays daily minimum and maximum temperatures and moisture levels at two different soil depths. The “Temperature and Rainfall Summary” shows the average, minimum and maximum air temperatures -- precipitation -- degree-day accumulations during the previous 2 weeks. The “Overnight Temperatures” tool lists hourly average temperatures during the previous night for all stations in the area and low temperature forecasts for the upcoming night. Other tools include forecast data for the upcoming week.

To see weather conditions for last week, last month or last year, select “Change Date Range” at the top of the table and enter the desired date(s). Use the pull-down menu at the top of the page to access information from another weather station.

Enviro-weather also has tools for specific crops. Click on “Field Crops” from the “Tools For” bar near the top of the screen to go to the “Commodities Page” (Figure 2). The same weather summaries are shown, but the page also includes additional, specialized tools and links to resources for different crops (alfalfa, corn, soybeans, wheat, etc.). Click on the crop folder in the left sidebar to display available crop development, pest management, and water-use tools and other resources for that crop.

Some tools of special interest for Michigan dairy producers include:

1. **The Alfalfa Cutting Model** predicts the optimal time for first cutting of alfalfa (approximately 40% NDF, which corresponds to 750 GDD base 41 F according to Allen et al.).

2. **The Alfalfa Weevil development model** is a new tool that predicts when to expect feeding damage from alfalfa weevil. The data can be used to make decisions about pest scouting and treatment.

3. **Crop ET (evapotranspiration)** estimates for corn and soybeans help with irrigation decisions. Users specify crop type and emergence dates and Enviro-weather produces a table showing temperature, rainfall and potential evapotranspiration (PET) for the crop.
along with 1 week of forecast data. If cumulative PET is higher than cumulative rainfall, the “PET today” cell is shaded red indicating a net water deficit for the crop.

An Irrigation Scheduling tool recently was updated and improved (listed under “Water-use Tools”).

There are also a links to resources such as the Field Crops Pest/Crop News, New Ag Network, and MSU’s IPM (Integrated Pest Management) Resources. Enviro-weather also provides data to help you maintain accurate and complete records to comply with Generally Accepted Agricultural and Management Practices (GAAMPs). Record keeping requirements include weather conditions during pesticide applications and manure applications. You can access and print historical weather data, current weather data, and future forecasts for the nearest Enviro-weather station to comply with these requirements.

More Things to Come
Enviro-weather will soon be adding several additional tools, including predictive models for western corn rootworm and black cutworm, and a manure management tool that will allow dairy farmers to print out precipitation forecasts for their records.

We invite you to check out Enviro-weather’s tools and services. We continue to grow and develop and are adding continuously to our suite of tools and stations. Enviro-weather exists to serve you and Michigan dairy producers. We want to be responsive to your ideas and concerns. Please direct your questions, comments and ideas to me (Beth Bishop): 517-432-6520 or bishopb@msu.edu.

Enviro-weather is a collaborative project between the Michigan Climatological Resources Program and the MSU Integrated Pest Management Program and is supported by Project GREEEN, the Michigan Agricultural Experiment Station, MSU Extension, private donors, and MSU Departments of Biosystems and Agricultural Engineering, Crop and Soil Sciences, Entomology, Forestry, Geography, Horticulture, and Plant Pathology along with HortSystems, Inc. (MDR).

Reference
People talk a lot about time management. They want to prioritize their tasks and efficiently budget their time.

Dairy cows have their own time budgets. Behavioral routines of dairy cows have been observed to determine the amount of time spent on various activities. Rick Grant (2009) of the Miner Institute in New York reported a typical daily time budget for basic behavioral needs of lactating dairy cows in a freestall environment (Table 1).

Table 1. Typical time budget for lactating dairy cows.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time devoted to activity per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating</td>
<td>3-5 hr (9 -14 meals per day)</td>
</tr>
<tr>
<td>Lying down/resting</td>
<td>12 -14 hr</td>
</tr>
<tr>
<td>Standing/walking in alley</td>
<td>2-3 hr</td>
</tr>
<tr>
<td>Drinking</td>
<td>30 min</td>
</tr>
</tbody>
</table>

The time standing in the alley includes socializing and moving between the feed bunk and stalls. Similar amounts of time for resting, feeding, and drinking have been reported by Cook (2008).

Total time spent ruminating (either lying or standing) is 7 to 10 hours. Cows are more apt to ruminate while lying down. Overstocking, prolonged time in headlocks, and uncomfortable resting surfaces can negatively affect rumination.

When accounting for the basic behavioral needs of a lactating dairy cow as listed above,
5 hr eating +
12.14 hr lying/resting +
2.3 hr standing/walking in alley +
0.5 hr drinking =
20.5 to 21.5 hr per day (total),

that leaves 2.5 to 3.5 hours per day for milking and other herd management activities.

Requirement for Rest
Dairy cows have a strong motivation to rest. Their natural behavior is to meet their requirement for resting, which may mean giving up some time for eating. Studies also have indicated that cows exhibit stress responses when they cannot meet their resting requirement.

Grant (2009) has proposed that each additional one hour of resting time is associated with 2 to 3.5 more pounds of milk/cow per day. Other research (Cook, 2008) did not find a similar relationship. However, that research did show more lameness in cows that had reduced resting time. Lameness generally has a negative impact on milk production.

To ensure that dairy cows can meet their requirement for rest, herd management activities that reduce resting time should be avoided. Several common challenges to a cow’s time budget that have been identified by Grant (2009) and Cook (2008) include:
- Overstocking
- Uncomfortable free stalls
- Excessive time outside of pen
- Prolonged time in lock-ups

Overstocking
Several studies have evaluated different stocking densities in groups of dairy cows. In general results indicated that at stocking densities of 120% or greater resting time is reduced by 12 to 27% and standing time increased by 15 to 25%.

Overstocking may have more significant effects on first-lactation cows that are grouped together with older cows (Grant, 2010). At 100% stocking density, when compared to older cows, first lactation cows had a 10% reduction in dry matter intake, 20% reduction in resting time, and less drinking and rumination time.

Maintaining optimal stocking density for close-up dry and fresh cows is especially critical. Decreases in dry matter intake can be an underlying factor in the incidence of fresh cow problems. Nordlund and coworkers (2006) recommend that stocking density in close-up dry and fresh cow groups be determined primarily on bunk space. They
sugges...30 inches of bunk space per cow for these two groups. In addition, stocking density should be less than 80% of stalls in the pre-fresh group, especially if the group includes both heifers and cows (Grant, 2009).

**Uncomfortable Stalls**
The amount of time that cows rest or spend lying down is significantly influenced by their willingness to use the stalls. The availability of a stall does not necessarily mean that it will be used.

Freestalls must be designed to allow cows to easily lie down and rise. The surface must be comfortable for the cow while lying. In addition, the cows need to be properly positioned in the stall (either standing or lying) to minimize soiling the bedding. The length and width of the stall as well as the position of the neck rail and divider loop depend on the size of the cows housed in the pen.

The type of surface cushion and traction influences the use of a stall, especially for lame cows (Cook, 2008). A firm, unyielding surface is more painful for cows with sore feet when rising or lying down. Consequently, they are apt to spend more time standing in the stall and will have fewer lying sessions per day. Sand is an optimal bedding, providing good traction and support to the weight bearing legs during rising and lying movements. Cows spend less time standing in sand-bedded stalls.

Recommendations for freestall dimensions and design have changed over time. MSU Extension Dairy Educators are available to help evaluate current freestall dimensions in dairy barns or provide information on updated freestall recommendations for barns being constructed or remodeled.

**Excessive Time Outside Pen**
The primary reason for cows to be outside of their pen is for milking. Considering the time budget in Table 1, about 2.5 to 3.5 hours are available per day for milking. This would include travel time to and from the parlor, time in the holding area and actual time in the parlor. For a herd milked 3 times a day, this would translate to 50 to 70 minutes per milking.

Number of cows in a pen, cows milked per hour, and distance to the parlor determine the amount of time that a cow is out of her pen for milking. When designing a new milking center, the optimum pen size should account for stocking density, as well as number of stalls in each pen. More time will be required to milk a pen of cows as the stocking density increases.

**Prolonged Time in Lock-ups**
Given the time spent on basic behavioral needs by dairy cows and time used for milking, little free time is left for cows to spend in other activities. Time spent in headlocks will compete with the other behavioral needs. While in headlocks at the feed bunk, cows can spend some time eating. However, after delivery of a fresh batch of feed, cows typically are ready to lie down and rest about 45 to 90 minutes later (Cook 2008).

Minimizing time in lock-ups is essential for fresh cows. These cows are most in need of a stress-free environment and minimum disruptions to their daily routine. It is recommended that this group of cows be limited to no more than 1 hour per day in headlocks (Grant 2010).

**Summary**
Behavioral needs of dairy cows have been observed to determine typical amounts of time budgeted to various activities. Dairy cows have a strong need for rest (lying down), requiring 12 to 14 hours per day. When time spent lying down decreases, lameness can increase and efficiency of rumination declines.

Disruptions to the cow’s time budget can be minimized by avoiding overstocking, providing comfortable freestalls, and preventing prolonged times for milking and in lock-ups. Striving to keep dairy cows within their desired time budget will ensure good cow welfare, health and performance.

**References**


Interim Chair of Animal Science Department Named

Dr. Janice Swanson was named acting chair of the Department of Animal Science at Michigan State University (MSU).

Swanson succeeds Dr. Karen Plaut who resigned her position as of May 15 to accept a position at Purdue University. Swanson currently serves as director of Animal Welfare at MSU, where she coordinates outreach, teaching and research in the area of farm animal behavior and well-being with a focus on social responsibility in the food system. She holds faculty appointments in the Department of Animal Science in the College of Agriculture and Natural Resources, and the Department of Large Animal Clinical Sciences in the College of Veterinary Medicine.

Swanson received a Ph.D. in applied animal ethology from the University of Maryland and master’s and bachelor’s degrees in animal science from the University of Connecticut. Her professional employment includes 5 years with the USDA Animal Welfare Information Center before joining the Department of Animal Sciences and Industry at Kansas State University.

Swanson was appointed as interim department head at Kansas State in August 2004 and joined the MSU faculty in July 2007.

Powers heads the Ag Institute

Michigan State University Extension (MSUE) named Wendy Powers, Ph.D., director of its new Institute for Enhancing Michigan’s First Green Industry: Agriculture and Agribusiness. Powers is a professor in the Departments of Animal Science and Biosystems and Agricultural Engineering at Michigan State University and is MSU’s director of environmental stewardship for animal agriculture.

The new institute is one of four that have emerged from the statewide restructuring of MSUE.

In her new role, Powers will be responsible for directing education efforts across all agriculture and agribusiness opportunities and issues. She will lead a team of MSU Extension educators spread across all 83 Michigan counties and work closely with MSU faculty members to help define the hot-button issues for agriculture throughout the state. In addition, she will remain director of environmental stewardship for animal agriculture.

Powers joined Michigan State University in 2006. She has a bachelor’s degree from Cornell University and a master’s degree and doctorate degree from the University of Florida. Prior to joining MSU, she was an associate professor with Iowa State University.

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www.msu.edu/user/mdr/
Study Abroad Explores the Dairy Industry in Holland & Belgium

Elizabeth Karcher and Mike VandeHaar
Dept. of Animal Science

From May 16-31, 20 Michigan State University students participated in a 3-credit study abroad program focusing on dairy husbandry and environmental stewardship. Traveling with Animal Science faculty leaders, Dr. Elizabeth Karcher and Dr. Mike VandeHaar, the students explored the dairy industry in the Netherlands and Belgium.

The group consisted of 19 undergraduate students in Animal Science (16), Zoology (1), Agribusiness Management (2) and, Veterinary Medicine (1). Before the trip, the group met twice to discuss key differences between the U.S. and The Netherlands. Students were given the task of working on problem statements before departure and during the program. These statements ranged from the question of sustainability to regulations surrounding manure management. In addition, the students were asked to keep a daily journal documenting their experiences.

Experience for Students
The study program was a combination of visiting private dairy farms, agricultural companies, and universities. A highlight for students was the opportunity to live on a farm with a Belgian host family for 2 days. Visiting dairy farms allowed the students to observe first hand the environmental issues and regulations facing dairy farmers in Belgium and The Netherlands. Many of the farms visited made their own cheese, so students also sampled cheese and learned how cheese is made.

Three companies helped sponsor activities. Lely Industries provided a tour of their factory and of a local farm and gave the students insight into the complexities of designing and constructing a robotic milking machine. Scientists at Provimi (animal nutrition company based in Rotterdam) talked to the students about their current areas for ruminant nutrition research. Finally, Alltech, Inc. arranged a day with government regulators in Brussels and a visit to biogas generator to show ways in which many Belgian farmers are dealing with manure management.

Two of the most popular activities among the students were the opportunities to interact with faculty and staff at both CAH Dronten and Wageningen University. Members of the CAH Dronten dairy club arranged a full day of discussions and farm visits for the students and concluded the day with a social activity. Several MSU students commented that the interaction with their peers at another school really provided insight into Dutch agriculture and culture.

“Studying dairy husbandry and environmental stewardship in The Netherlands and Belgium was a very enlightening experience for me because it was like looking into the future of how resources will be managed as our country gains human and animal population density...”

Continued on page 20
More Food Animal Veterinarians Are Coming

Roy Fogwell
Dept. of Animal Science

In fall of 2010, the College of Veterinary Medicine will consider the fifth group of applicants as Production Animal Scholars. Before they even apply to the College of Veterinary Medicine (CVM), these applicants have academic excellence, extensive experience with management of food animals, and experience with food animal veterinarians. The main goals of the program for Production Animal Scholars are to produce more and better food animal veterinarians.

Who is a Production Animal Scholar?
At Michigan State University this is a pathway into CVM that avoids the competition with a large and diverse pool of applicants. Production Animal Scholar applicants only compete against other Production Animal Scholar applicants. Production Animal Scholars is a rigorous academic option within the Department of Animal Science focused on improving knowledge of science, management, and finances of food animal production. Successful applicants must desire to be veterinarians who work with food animals, such as cattle, poultry, sheep, or swine.

Production Animal Scholars is an undergraduate program that prepares students for a career in herd-based agricultural veterinary practice. In addition to current pre-veterinary requirements, students enrolled in Production Animal Scholars study animal management, farm finance, statistics, and advanced sciences. Coupled with academics, there is also a requirement that these students have direct experience with animal husbandry and management on farms. Even if students do not attend veterinary college, with the additional study in finance, science, and farm experience, this program represents an excellent education for numerous careers.

Production Animal Scholars provides an additional pathway for admission into CVM. Each year after a competitive selection process, up to 10 students who meet the requirements may be granted admission to the professional veterinary medicine program. In 2010, there likely will be more than 10 Production Animal Scholar students who will apply to CVM. For each class of about 100 veterinary students, only about 10 to 20 people are interested in food animals. Thus, there is arguably not an adequate supply of new food animal veterinarians.

Time to Apply
Application to CVM can occur midway through the bachelor’s degree program. Successful applicants can start the professional program in CVM only after completion of their degree in Animal Science. Accepted students must maintain a 3.2 grade point average through their undergraduate studies. Most students apply to CVM after 3 years, spend 4 years as an undergraduate, and then start CVM. Alternatively, a student from an urban area who may show interest in food animals after attending college, will need extra time to complete the experience required for Production Animal Scholars, and may apply to CVM after their undergraduate degree is completed.

Students who are interested in livestock agriculture and veterinary medicine as a career should consider a major in Animal Science with the Production Animal Scholars concentration. The Department of Animal Science coordinates this undergraduate program. Except to major in Animal Science, there are no entrance requirements or selection criteria for a student to be a Production Animal Scholar in Animal Science. However, there will be forthright discussions about professional goals, experience, and academic performance.

In addition to the academic and experiential requirements Production Animal Scholars participate in field trips, seminars, and special
clinical experiences. Production Animal Scholars should not be viewed as an easy approach to gain admission into CVM. The academic requirements for Production Animal Scholars are high, the level of work is rigorous, and the standards for admission into CVM are uncompromised relative to regular applicants.

However, for students who satisfy the requirements, there is a huge statistical advantage for Production Animal Scholars for acceptance into CVM. Currently there is a position for every applicant who satisfies the requirements.

Note that the statistical advantages for Production Animal Scholars only apply to CVM at Michigan State University. Importantly, passion for animals and competence with handling animals are not adequate for acceptance into CVM. Passion for science and academic excellence are critical.

Requirements
Production Animal Scholars participants must have a strong commitment to livestock agriculture. It is not necessary to be raised on a farm to qualify.

Commitment and passion for food animals can be demonstrated with youth activities, family experiences, employment, internships, extracurricular activities, research, or other forms of service or activities within the livestock industry. There are many ways that students from diverse backgrounds may demonstrate a commitment to livestock agriculture.

Students at Michigan State University who are majoring in Animal Science may wish to enter the professional veterinary medical program without involvement in Production Animal Scholars. These students may apply through the regular veterinary admission process and will compete with other applicants for admission into CVM.

All candidates for the professional veterinary medical program, including Production Animal Scholars, will be selected for admission into CVM entirely by the Committee on Student Admission that is based in CVM. Except for letters of reference that students solicit from various faculty members, the Department of Animal Science has no direct role in the admissions process to CVM.

The Departments of Animal Science and Large Animal Clinical Sciences are very committed about this educational opportunity for future veterinarians. In addition, we are enthusiastic and optimistic that this program will help to address the current shortage of veterinarians for food animal production medicine.

If you have questions or seek more information about Production Animal Scholars please visit the academic programs section within the MSU Department of Animal Science web site at http://www.canr.msu.edu/dept/ans/ or contact Dr. Roy Fogwell at fogwell@msu.edu or (517)-432-1385. For specific requirements check the CVM web site: http://cvm.msu.edu/student-information/dvm-program-admissions/production-medicine-scholars-admissions-pathway-1

What’s Happening
July -- October

NMC Regional Meeting -- Mastitis Control & Milk Quality

Date: September 8-9
Venue: Crowne Plaza Hotel, Grand Rapids, Michigan

The NMC announces its 2010 regional meeting. The conference program focuses on practical mastitis control and milk quality information, ranging from on-farm application tips to discussions on milk quality as they relate to consumers. Representatives from all segments of the dairy industry, including producers, veterinarians, consultants, equipment and pharmaceutical suppliers, dairy plant field staff, extension educators and specialists, and students, are expected to attend.

The NMC is a not-for-profit professional organization with over 1,500 members in more than 40 countries.

Visit www.nmconline.org to learn more about program content, registration information, and fees.

For further information, contact: Christina Jorgensen, Filament Marketing (608) 310-5335 ext. 23, or Anne Saeman, NMC executive director, at (608)-848-4615.
Winter Dairy Program on Fresh Cow Health: What Attendees Said

Phil Durst
Extension Dairy Educator - Northwest Michigan

The 2010 MSU Winter Dairy Program had a great turnout across the state with over 450 producers and industry representatives attending the nine locations.

This year attendees could use new technology to respond to questions immediately with a hand-held clicker. After each question, the participants’ answers were tallied and displayed so that everyone could see the distribution of responses. Here are the results from all nine sites.

Who Attended?
Among those attending, 47% were the owners or managers of the dairy, 29% were dairy farm employees and 23% were professionals who work with dairy producers. Attendees tended to be younger with 42% of those attending less than 35 years old. Only 16% were 55 or older.

Among dairy farm owners, managers and employees:
• 48% came from herds with fewer than 200 cows.
• 31% came from herds with 200-500 cows.
• 21% of dairy farm participants attending were from herds with greater than 500 cows.

Of agricultural professionals in attendance,
• 43% work with herds totaling less than 5,000 cows;
• 33% with herds totaling 5,000 to 20,000 cows; and,
• 22% work with herds totaling over 20,000 cows.

Attendees also were asked about their use of the Internet. The responses reflect not just those of dairy farm owners, managers and employees but also those of industry representatives in the audience.

• 63% access the Internet several times a week or daily to obtain information for their business.
• Only 18% never use the Internet or less than once per month accessed it for business information.
• Yet 78% had not participated in any on-line programs such as Webinars within the past 6 months.

Dairy farm producers use the expertise of others to help them manage their complex businesses.

• 80% said that they used a farm management team that involved professionals from outside the farm.

Animal Well-being
One of the main themes of the program was about good animal care.
• 93% had a better understanding of public perceptions about animal welfare as a result of attending.
• Regarding all the attention being given to cow well-being these days, 71% understood the need to make it a priority.

Participants were asked to rank their response to animal welfare based on the program. The order of responses, with 1 being the highest rank, was:

1. Those who said that they would work to keep well-informed on this topic.
2. Those who replied that they understood the issues better.
3. Those who said that they would make management changes to improve animal welfare on their farms.

In addition,
• 75% said they either definitely or probably would communicate more with the public about animal welfare and care of dairy animals.

The potential for third party evaluation of farms drew a mixed result, likely because it was unstated who that third party might be, what specifically would be evaluated and how that information would be used or available for others to see.

• 26% said that they understood that cow comfort was important but didn’t see a need to prove it to anyone else.
• 56% said that they would consider a third party audit of animal welfare practices in their farms.
• 89% believe that there are
adequate resources available to help them with an animal welfare audit.

MSU Extension is one resource for information on animal well-being standards and practices. In addition, National Milk Producers Federation has established a National Dairy FARM (Farmers Assuring Responsible Management) program to verify on-farm practices. Many dairy cooperatives including those serving Michigan farmers are supportive of this program.

Locomotion scoring, culling and death losses in fresh cows, and bulk tank somatic cell count were presented as ways to measure animal well-being on the farm. MSU Extension Educators described how to do locomotion scoring and then use those scores to evaluate the foot health of the herd. Yet it is a tool that, while not new, has been under-utilized on farms.

- 34% were previously not familiar with locomotion scoring.
- Only 25% of farm participants had either scored their cows using locomotion scoring system, or a professional who works with them had done it.

Nutrition, Feeding, Grouping and Metabolic Health
Participants were asked about current practices in regard to feeding and grouping cows in their herd.

- 57% have more than one dry cow ration
- 50% have a separate fresh cow ration
- 38% feed the same ration to all milking cows.

Whenever there is more than one group for lactating cows, then the question is on what basis are cows moved to a different group. Currently,

- 87% use days in milk (DIM) as their indicator for moving cows out of the fresh group, either as the sole criteria or in combination with other factors.
- 75% who have a high group, move cows out of that group using milk yield as an indicator, either alone or in combination with DIM or body condition score.

MSU nutritionists discussed using rumen fill scores as an indicator of when the fresh cow’s rumen is geared up and the cow she is ready to move to another ration. They also recommended body condition score (BCS) as the indicator to move cows from the high group.

- Two-thirds of producers said that the information presented at these meetings would influence the way that they group cows.
- 81% of those who have a fresh cow group said they would consider using rumen fill scores as an indicator to move them.
- 79% of those who have a high group and who don’t already use BCS said that they would use it to decide when to move cows out of this group.

Reproductive Health
MSU researchers explained the variation in conception rates that could be related to Sire Conception Rates (SCR) of bulls.

- 29% reported that they already use SCR to choose high fertility bulls.
- 39% of others said that they are seriously considering using SCR to improve the fertility in their herds.

Programmed breeding protocols including the G6G protocol also were presented.

- 20% of producers already use the G6G program
- 33% of those who do not, are seriously considering using it as a result of what they learned.

Udder Health
In the farewell series of producer meetings for Dr. Phil Sears who retired April 1, 2010, he emphasized themes and recommendations that he has developed over the years. Adoption of some of those recommendations is shown by the fact that:

- Two-thirds of producers use the California Mastitis Test (CMT) either routinely, on high somatic cell count (HSCC) cows, or fresh cows.
- 28% treat HSCC cows based on culture results.
- 15% of producers do their own milk culturing on-farm.
- As a result of this program, 35% either would like to do their own culturing or are thinking about it.
Proactive Farm Management with a Plan

Dennis Stein
Extension Farm Management Educator

Farm Management

When things get tough consider developing a plan of action. For many dairy farms, today is an excellent time to build or update a farm business plan. Often people think of this as a tool that is only used when a person is trying to start or expand an existing farm. You are now in a situation where the market price for milk has pushed your farm to change its operations to meet current and future financial situations.

This may not be what you want to do but a business plan is a great tool to empower the current owner/management and the future owner/management to flesh out their vision of the future. If you are uncomfortable with the idea of writing a full business plan because it has so many components, just think of it as a series of building blocks. Placing one block at a time, you can build a complete detailed business plan.

What’s a Farm Management Plan?
Let’s look at a couple of points in the business plan that can be very helpful. When times get tough, it is important for any farm or business to stay focused on the mission. The mission statement should define what your farm business is all about and your business’s purpose. Use the mission to identify what is important and what is not important.

Mission Statement
When time and resources are limited, you need to stay focused on what is important. Along this same line, a mission statement can give you and your farm management team a sense of direction which is vital in the decision-making process. When resources are limited, you want to focus finances and efforts to those things that support getting the farm to that future place you want to achieve.

Goals
Another part of a business plan is keeping a set of current and future goals that the entire farm and management team are aware of and working toward. Having a vision of the future and goals are vital when putting together the farm’s cash flow projections. In addition, the vision will help the farm management team identify or prioritize what resources will be available for farm maintenance, repair and expansion. Yes, I did say expansion.

For me, expansion is the replacement of old equipment and buildings along with steps to continue to grow the farm’s business enterprise. In the current economic situation and in other cases, growing the farm may be one tool to help the farm become more cost-effective.

Every dairy farm today can benefit from having a clear written financial plan with 1 to 3-year cash flow projections. For many, you already have been submitting these to your lender as supporting information to help them feel comfortable with maintaining your line of credit. For the farm’s management team, these projections can serve as a set of benchmarks to measure the cost of inputs and revenues that are generated each month. By having monthly checks of the farm’s financial status, you can make smaller changes, if needed, rather than trying to dig out of a hole after 6 or 9 months of not knowing. In tough financial times, keeping closer track of the income and expenses will be more comfortable and productive so that you can take actions and work with your suppliers, customers and lenders on a proactive basis.

A farm business plan may not in itself make your farm more profitable. But, a farm with a plan has put in place a road map that can help focus (or refocus) the efforts of the farm’s ownership and management teams. The business plan can be used as a tool to help both input supply companies and lenders to see the direction and action steps that you are taking on your farm to ensure its future.

Putting this all together using the farm’s business plan as the guide can in many cases bring together a much larger and more focused team that can work together with the success of your dairy farm as the goal.

Ask for Help
If you are not sure how to get started, you can ask your local Michigan State University Extension.

Continued on Page 23
Protect Your Herd from Chemical Residues

Jamie Morrison
Dan Grooms
Dept. of Large Animal Clinical Sciences

Dairy Health

While cleaning up around the farm it is a good time to take a look for possible chemical contaminants that could impact the health of your animals or the safety of the products they produce. Dairy and beef farmers are aware and diligent about avoiding antibiotic residues but a multitude of other chemicals exists that also could end up in animals and contaminate milk and meat. Environmental hazards, pesticides and herbicides as well as feed contamination issues should be kept on your chemical residue awareness radar screen.

Recent accidental exposure of cattle to chemical hazards include accidental exposure to high doses of Rumensin® (Anderson and Grooms, 2009)*, anhydrous ammonia (Fitzgerald et al., 2006), benzene from gasoline, organophosphate insecticides, and feed grade antibiotics. In each of these cases, quick action prevented any food safety issues and limited animal health consequences. If a chemical contamination event on farm is discovered or suspected, immediately notify your veterinarian or the Michigan Department of Agriculture toll free number 800-292-3939 during normal business hours or their emergency answering service 517-373-0440 after hours.

Taking action to prevent accidental chemical contamination is not only vital to protect the health of your animals and the safety of the products they produce, but it is also important from an economic perspective. Under the best of circumstances, if a chemical contamination event were to occur and immediate action initiated, it may take weeks for a farm to regain market access for their products. This is due to the lengthy process of finding an approved laboratory with verified testing for uncommon residues and then waiting an appropriate length of time for chemicals to be removed (withdrawal times) from the body. As you are well aware, being unable to market milk or meat can have devastating financial consequences.

Action Points
Here are some action points that you can initiate now to help reduce the risk of chemicals accidentally coming in contact with your cattle:
- Any chemical to be discarded should be handled according to local, state and federal regulations.
- Make sure all chemicals and drugs are stored in a safe, secure place away from animals and their feed/water sources. Follow all storage and containment regulations.
- Make sure that fuel storage areas are properly located and spill containment barriers are in place.
- When using, moving or disposing of chemicals, do not use equipment, such as skid-steers, that are also used for feeding your cattle.
- Contact your feed mill and ask what they are doing to prevent chemical contamination of feed-stuffs. Make sure they have routine quality control programs to reduce risk of contamination at the manufacturing level.
- Check purchased feed on delivery for color, odor, moisture, temperature, and evidence of foreign material or bird, rodent or insect contamination. Make sure the feed delivered is what you ordered.
- While cleaning up the farm, it is a good idea to think about a contingency plan. If an inadvertent chemical contamination event was to occur, it is necessary to know who to contact and how milk and affected animals will be handled.

To maintain consumer confidence in dairy and meat products, dairy farmers must maintain a diligent awareness of chemicals on their farm. Take action now to reduce these risks.

For more information about emergency planning and farm safety, go to http://web1.msue.msu.edu/emergency/.

* References are listed in the web version.
Johne’s disease or paratuberculosis is an infectious disease in cows, caused by *Mycobacterium avium subspecies paratuberculosis* (MAP). In many countries, the prevalence of MAP in dairy herds has been estimated, and these estimates are usually very close. Most studies show an apparent prevalence of infected cows in MAP infected herds in the 5-10% range (Woodbine et al. 2009, VanSchaik et al. 2003).*

Given this low estimated MAP prevalence, it is surprising that no reports have been published about long-term infection-free herds. Most studies that report on the implementation of control programs, report a dramatic decrease in incidence and prevalence, but never a full elimination of the infection. An example of such a control program in a well-monitored dairy herd is shown in Figure 1 (Benedictus et al., 2007).

**Fig. 1: Prevalence of shedding, infected animals and the incidence of MAP infection during a 20-year longitudinal study in a dairy herd going through a MAP control program (from Benedictus et al. 2007).**

Clearly, Johne’s Disease eradication programs based on known MAP transmission routes were not successful in eliminating the disease from these herds. There are at least two lessons to be learned from results in Figure 1. First, there are likely more routes of MAP transmission than we currently recognize. Second, the low incidence and prevalence that were observed after implementation of control programs (after 1995 in Figure 1) are unlikely to be correct, as culling of a few infected cows would lead to elimination of MAP infection in many herds going through such a control program.

Recent studies have provided evidence for other previously not recognized routes of MAP transmission. A study by VanRoermund et al. (2007) showed that infected calves may be infectious to their peers in birth cohorts. These calves would be shedding infectious organisms and because of their close contact with susceptible individuals, transmission of infection would occur. A hallmark of such calf-to-calf transmissions would be the presence of clusters of infected animals when sorted by day of birth as shown by Benedictus et al. (2007) and Pradhan et al. (2009).

A second little recognized transmission route was recently proposed by Pradhan et al. (2009). They argued, based on molecular typing of MAP strains, that adult animal infection is an important route of transmission in dairy herds. Animals shedding very high numbers of bacteria (so called ‘super shedders’) were particularly able to infect other adult animals.

It was observed that in the presence of super-shedders in dairy herds, approximately 50% of animals other than those identified as super-shedders shed the same strain as that of contemporary super-shedders. When these low shedders were followed through to slaughter, about 60% of these suggestive adult infected cows showed a tissue infection with the same strain as the super-shedders. Thus, adult infection may be much more important than previously thought.

Estimates of true prevalence of MAP in dairy herds vary widely, mostly because of uncertainty in the ‘gold standard’ definition of infection status. Often fecal culture results are used as the gold standard, but it is also widely rec-
ognized that fecal culture results severely underestimate true infection status. Recent studies by the Regional Dairy Quality Management Alliance (RDQMA) provide strong evidence for a much higher actual prevalence of MAP infection than suggested by fecal culture results.

In this longitudinal multi-site study, animals in three herds were followed and tested from birth to slaughter. Results are presented in Figure 2 and show that MAP infection prevalence, as estimated by culture of intestinal lymph nodes and the intestinal tract, is at least 10 times as high as the MAP prevalence estimated by fecal culture. Although these results need confirmation from other projects and investigators, the much higher prevalence of infection in dairy herds would explain the inability of current control programs to eliminate MAP from dairy farms.

Recent economic models and economic data obtained from observational studies (Groenendaal and Wolf, 2008) show that control programs for MAP in dairy farms are generally only cost-effective when best management practices, particularly with regard to calf raising, were in place.

Extensive test-and-cull strategies alone were shown to be ineffective and costly for producers (Groenendaal and Wolf, 2008). Milk production loss linked to MAP infection was studied across a number of longitudinally followed populations (Nielsen et al., 2009, Smith et al., 2009).

In both of these studies, animals known to be infected with MAP, but shedding low bacterial numbers, did not show an important milk production loss relative to uninfected controls. Only when cows started to shed larger numbers of bacteria or when MAP ELISA values were increased for a prolonged period of time was a discernable effect on milk production present (Smith et al. 2009, Nielsen et al. 2009). These data would also indicate that test-and-cull strategies may be costly when applied across all MAP infected animals.

Models to Study MAP Infections
Mathematical modeling to study MAP infections in dairy herds has been proposed (Lu et al., 2008). With these mathematical infection models, MAP infections in herds can be simulated and studied. These models try to reflect the biology and epidemiology of MAP as realistic as possible, but often relatively simple models are used to study simulated infections. Despite their simplicity, mathematical models have shown to be useful in obtaining a better understanding of MAP transmission on dairy farms.

Some important results include the prediction that calf-to-calf transmission may play an important role in infection maintenance, the quantification of the importance of super-shedders in herds and a full understanding of the value of test-and-cull control programs in dairy herds (Lu et al. 2008). These mathematical models also provide a more generic insight into MAP infection dynamics in dairy herds.

The basic reproduction ratio or \( R_0 \) of a contagious disease is defined as the number of secondary infections after the introduction of a single infectious individual in a susceptible population (herd). A threshold value of 1 for \( R_0 \) distinguishes successful control measures (\( R_0 < 1 \)) from non-successful or a lack of control measures (\( R_0 > 1 \)). In Figure 3, the relationship between the \( R_0 \) value and the endemic infection prevalence is shown. When the \( R_0 \) value is below 1, the endemic prevalence is stable at zero. With increasing \( R_0 \), or a lack of control measures, the endemic infection prevalence increases in a sigmoid fashion (line A). Under normal circumstances, prevalence would decrease again along the same sigmoid curve.
Capturing Land-applied Manure in the Root Zone

Natalie Rector
Extension Nutrient Management Educator

Management practices that capture land-applied manure nutrients in the root zone will make the nutrients available for the season’s crop, improve soil quality, and prevent manure nutrient and contaminant loss in runoff. The idea of capturing manure in the root zone is quite simple, but in practice it can be quite challenging as weather, soil, and site-specific field conditions change.

The single most important tool in preventing manure nutrient and contaminant loss to the environment is your knowledge of your fields. Farmers know which fields are erosive and prone to rapid runoff during snow melt and spring rains. Manure will be lost in runoff water, so soil conservation practices should be employed that stabilize soil and hold land-applied manure in place. Avoid applying manure before forecasted rain and spring thaws.

The best manure management plans are custom designed on a field-by-field basis. These plans will be established within the context of established best management practices and fine-tuned for each field by using a process of application, careful observation, and evaluation of the results. Apply manure, observe what happens, and evaluate the effectiveness in capturing manure in the root zone where it will be a benefit to your cropping system rather than be a hazard to the environment.

Actions to Reduce the Risk of Manure Runoff

- Establish a cover crop that will be growing during manure applications. Cover crops reduce sediment and nutrient runoff and improve infiltration.
- Decrease the manure application rate, and avoid spreading in the rain or when rain is in the forecast.

The following will form the foundation of your site-specific manure application plan.
- Manure should be uniformly applied and the amount applied should be known and recorded.
- Incorporate surface applied manure within 48 hours of application when weather conditions permit.
- Manure should not be applied to soils within 150 feet of surface waters or to areas subject to flooding (except when immediately incorporated and effective conservation practices are used to control runoff and erosion).
- Liquid manures should be applied in a manner that will not result in ponding or runoff to adjacent property, drainage ditches, or surface water.
- As land slope increases, the risk of runoff and erosion also increases. Soil and water conservation practices should be used which will control runoff and erosion for a particular site.
- Records should be kept of manure analysis, soil test reports, and rates of manure application for individual fields.
Special Attention to Tile-drained Land

When liquid manure is spread on tile drained land it can move within minutes to the tile lines through worm holes, root channels, cracks in the soil, and other macropores. High application rates and highly flowable liquids such as parlor wash water generally cause more problems than thicker slurries with a high solids content.

Evaluate the Risk of a Tile In-line Discharge:
- The first step in creating a field-by-field land application plan is to evaluate each field. Any field where subsurface drains discharge into ditches that flow to surface water should be considered a high risk field and monitored carefully before and after land application.
- Although a discharge could happen in any field, farmers report that problems are more likely with high application rates and highly flowable liquids such as parlor wash water.
- High application rates increase the probability of a discharge.
- No-till fields often have more worm holes and root channels than more conventionally tilled fields. An abundance of such large pores increases the likelihood of manure loss through tile lines.
- Clay soils (soil management groups 0, 1, 1.5 and 2.5) tend to shrink and crack. Soil cracks may provide a direct route to subsurface drains.
- Slurry injection is not a sure solution. Manure has been found in tile lines within minutes of injection with sweep injectors.

Actions to Prevent a Tile Line Discharge
- Excessive application rates increase the chance of runoff and a tile line discharge. Calibrate manure spreaders and verify that the calibrated rate is the rate that is actually applied to the field. Based on observation and evaluation, determine the right application rate for your fields. On some fields, the right rate may be considerably less than the allowable rate based on manure nutrient content.
- Use soil and water conservation practices such as crop residue management, and grassed waterways that prevent local ponding and overland flow. Local ponding can funnel waste water to tile lines through macropores.
- Use surface tillage to disrupt the continuity of worm holes, macropores and root channels and reduce the risk of manure reaching tile lines.
- Do not apply manure to tile drained fields when the tiles are flowing.
- Manure with a high solids content is less likely to move off-site. Separate lot runoff, parlor wash water and other water sources from the herd manure stream and handle them separately.
- Apply, observe and monitor tile outlets, evaluate the results, and make adjustments as needed to develop a site-specific land application plan. Match the manure application rate with soil infiltration rates and water holding capacity.
- Make more frequent, lower rate applications rather than a single heavy application.
- Should a discharge occur, have a plan for dealing with manure that may reach tile lines, such as blocking outlets or blocking the flow once it reaches the ditch.
- Surface applications with rapid incorporation may be the best choice on land with subsurface drainage. Conservation tillage before spreading will create a rough, permeable surface. Injection may actually increase problems by placing the manure closer to the tile lines.
- Decrease the manure application rate, and avoid spreading in the rain or when rain is in the forecast.
- Read, understand and adopt the Generally Accepted Agricultural and Management Practices for Manure Management and Utilization. These will help build the foundation of your site-specific manure land-application plan.

In the event of a manure release to surface waters, immediately call the Pollution Emergency Alerting System 1-800-292-4706.
KBS Dairy Achieves Leadership in Energy & Environmental Design Certification

Mat Haan
MSU Kellogg Biological Station

Introduction

The barn in the pasture-robotic milking system at the Michigan State University Kellogg Biological Station (KBS) is the first agricultural building in North America to receive Leadership in Energy and Environmental Design (LEED) certification.

LEED encourages practices that promote energy conservation, water use efficiency, carbon dioxide emissions reduction, improved indoor environmental quality, and natural resources stewardship during design, construction and building occupancy.

What’s LEED Certification?
The LEED certification process, administered by the U.S. Green Building Council (https://www.usgbc.org), is more often associated with schools, museums, and office buildings in urban areas than with farms.

The LEED certification can be earned for both new building construction and existing building renovations. Projects seeking LEED certification are required to incorporate certain principles into the new or renovated building design and construction.

Additional points are earned, based on the number and types of practices included in the construction process, to achieve the desired level of certification (Basic, Silver, Gold, or Platinum). LEED requirements and points are grouped into six areas: sustainable sites; water efficiency; energy and atmosphere; materials and resources; indoor environmental quality; and innovations and design process. The KBS dairy barn received LEED certification at the Silver level (New Construction - version 2.2) for the practices incorporated into the project.

All LEED-certified buildings must be at least 15% more energy efficient than the standards for that type of building, based on computer modeling of the facility. The KBS dairy barn exceeded this requirement and received additional points by including practices that enable the facility to be 38% more energy efficient than industry standards.

The use of recycled and regionally produced materials is also an important LEED principle; all LEED certified buildings are required to have a long-term recycling plan in place to reduce the amount of paper, plastic, and other waste going to landfills. In addition to a long-term recycling plan, over 11 tons of wood, concrete, and metal generated during the construction process were recycled. Instead of going to a landfill, additional concrete waste was used as the base for the parking area and driveway to the barn.

What the KBS Dairy Did

Over 34% of construction materials were recovered, harvested, or manufactured within 500 miles of the construction site. The use of regional materials reduced the carbon footprint of the project by reducing transportation energy that would have been required to ship materials from a greater distance. To improve air quality, all LEED-cert-
tified buildings are required to use refrigerant management systems that do not use ozone depleting chlorofluorocarbons (CFCs) or hydrochlorofluorocarbons (HCFCs).

To improve the internal air quality of the barn during construction and occupancy, paints, sealants, and adhesives used during construction were selected from a LEED-approved list of compounds producing a low level of volatile organic compounds (VOCs). A no-smoking policy was also put in place to reduce exposure of building occupants to second-hand smoke.

**LEED Certification Requirements**
The LEED-certification process sets certain requirements for all LEED construction, while also providing flexibility to fit different situations.

Because LEED is primarily used in urban areas, some of the points in the LEED checklist did not fit well with the construction of a dairy barn in a rural area. For example, LEED points are available for facilities built with easy access to public transportation and built within urban centers, points clearly not appropriate for a dairy barn.

To ensure that the KBS dairy included LEED principles in the design and construction of the barn and that it would achieve LEED certification on its completion, KBS worked closely with LEED Accredited Professionals throughout all phases of the design and construction process.

Some costs are associated with the selection of different construction materials (wood from a source certified by the Forest Stewardship Council) or inclusion of green energy technology (solar panels or wind turbines) into the project; other costs are directly related to the commissioning, documentation, and fees associated with receiving LEED certification.

LEED certification may increase project costs from 2.5 to 11% (or more), depending on the size of the project, level of certification, and types of practices included. Achieving LEED certification of the KBS pasture dairy barn increased project costs by about 4.5%. It is hoped that the inclusion of energy efficient design and incorporation of green building principles into the dairy barn will return this money to the dairy over time through lower energy costs for the farm.

It should not be the goal of every dairy farmer to achieve LEED certification for the construction of new facilities; however, small changes in design and construction of new facilities (along with updates in older facilities) can help save money in the long run.

“This new facility allows us to demonstrate to all dairy farmers how to incorporate features in a new barn that save energy, features that are both good for the environment and save them money,” says KBS director Kay Gross. “Many features of this barn that earned the LEED certification can be adopted by dairy farmers with different management and herd sizes.”

This project was made possible through a grant from the W.K. Kellogg Foundation and additional support from Michigan State University Extension, Michigan Agricultural Experiment Station, and the Michigan State University Office of the Provost, and College of Agriculture and Natural Resources.

For additional information about the dairy, contact Mat Haan, KBS Pasture Dairy Project Coordinator, at 269-671-2360 or e-mail: pasture.dairy@kbs.msu.edu; you can also visit us on the web at http://www.kbs.msu.edu/research/pasture-dairy.

“The LEED requirements and points are grouped into six areas: sustainable sites; water efficiency; energy and atmosphere; materials and resources; indoor environmental quality; and innovations and design process. Of the four levels of LEED certification -- Basic, Silver, Gold and Platinum -- the KBS dairy barn received the Silver”
Study Abroad to Holland & Belgium…
Continued from Page 7

While in Wageningen, several faculty members took the time to meet with program participants to discuss issues ranging from organic farming and sustainability to nutrition and environmental concerns. Participants also toured two of Wageningen UR’s research dairy farms - Waiberhoeve and Aver Heino. The 4-day visit to Wageningen ended with a student social hosted by Wageningen Animal Science students.

Besides Academics, Fun
The program also allowed plenty of time for students to experience a new culture. Activities included a canal cruise in Amsterdam, a visit to the Anne Frank House and two art museums; and shopping at city markets. Students learned first hand why the Dutch stay reasonably thin - they ride bikes everywhere. We bicycled in Wageningen, Doorn, and the National Park de Hoge Veluwe.

Students also learned about Dutch trains and public busses - dependable, on-time, and orderly. Several students, accompanied by Karcher, spent a Saturday touring Cologne, Germany. Of course, all of the program participants enjoyed dining on “pannekoeken” (Dutch pancakes) and Belgian waffles.

In Their Own Words
When asked what it meant to participate in this study abroad, Allan Merger (Animal Science, senior), responded by saying “Participating in this study abroad meant a chance to broaden my horizons by experiencing the dairy industry in a different cultural setting. Visiting farms, talking with farmers, and meeting Dutch agricultural students my age through this program has increased my global awareness.”

According to Tera Koebel (Agribusiness Management, sophomore), “Studying dairy husbandry and environmental stewardship in the Netherlands and Belgium was a very enlightening experience for me because it was like looking into the future of how resources will be managed as our country gains human and animal population density.”

“Since those countries are so much smaller (compared with the U.S.) and everyone lives so closely together, the farmers have to be very strategic with their management of land, cattle, and wastes which are all issues that the United States will likely become more strict with over time. By traveling there to see their farms and hear firsthand how they cope with these challenges, I am able to help prepare my family’s farm and use my studies at Michigan State to help people in agriculture to be one step ahead of the regulatory processes to come.”

Long Before It All Started
In June 2009, Karcher and VandeHaar set out to initiate a new study abroad program. The goal of the program was to learn about animal agriculture, especially dairy farming, and how economic, environmental, and social policies in The Netherlands and Belgium have affected it.

These two countries were chosen because they have climates and water resource issues similar to Michigan, English is commonly spoken, and flights to Amsterdam are reasonably priced. Moreover, they have greater population densities for both cows and people than Michigan, so environmental and social concerns about farming receive even more attention than in the US.

In 2008, VandeHaar did a sabbatic at Wageningen University in the Netherlands, partly with the intent of developing a study abroad program. In 2009, Karcher visited the two countries to meet with contacts and arrange the program.

Conclusion
The first year of the program was a success and both Karcher and VandeHaar are looking forward to taking another group of students in May 2012.

Karcher states, “The most rewarding part of the trip for me was the opportunity to increase my interactions with MSU undergraduate students and to watch the students’ personal growth as they were forced into situations outside their typical comfort zones. In 2 short weeks it was easy to observe the increased global awareness and confidence exhibited by many of the program participants.”

For more information on this study abroad program, please contact Dr. Elizabeth Karcher (ekarcher@msu.edu).
Spartan Dairy 3.0 Is Ready

Mike VandeHaar
Dept. of Animal Science

Spartan Dairy 3.0 ration evaluation program is available as a 60-day demonstration version that can be downloaded for free at www.spartandairy.msu.edu. Spartan 3.0 uses a spreadsheet interface, similar to Spartan 2, but it is a complete remake of the program with many new features and completely new nutritional model and user interface. It was designed to formulate reasonable diets in a relatively short period of time using the latest science.

Key Features
- A stand-alone program that runs on MS Windows 7 (64-bit), Vista, or XP
- Solid science: uses NRC 2001 and additional improvements developed at MSU
- Lots of information: 120 feed characteristics to help with troubleshooting
- Adaptable: balance a diet with just the “Home” tab or with all 120 columns
- Tested: used in teaching at MSU for 3 years and on test farms for 2 years
- Nutrient management information for environmental sustainability
- Several rations and feed libraries can be open simultaneously
- Feeds can be copied and pasted from one file to another, and to and from MS Excel to facilitate updating feed analyses
- Reports can be previewed before printing
- Nutritional adequacy can be previewed in graphical form

Download at: www.spartandairy.msu.edu

Winter Dairy Program …

Continued from Page 11

Teat-end scoring was presented as a means to evaluate physical factors that contribute to the incidence of contagious mastitis.

- 72% said that they plan to use teat-end scoring in their herd.

Overall
- 96% of attendees found this program to be useful for their dairy business
- 39% rated it as very useful.

The MSU Extension Dairy Team thanks the many sponsors and supporters of the 2010 Winter Dairy Program, “Animal Health: Tools to Navigate the Fresh Cow Storm”. Twenty companies sponsored the meetings. In addition, 11 veterinary practices, one feed cooperative, and Michigan Milk Producers Association provided vouchers to reduce the cost for their clients or members to attend.

MSU Extension seeks input for future educational programs from producers and industry professionals. Your input can be sent to your MSU Extension Dairy Educator or to Phil Durst, MSU Extension Dairy Team Co-chair (contact information is listed on page 3 of this publication).

The author wishes to acknowledge the work of Dr. Kathy Lee, Extension Dairy Educator - Northwest Michigan in summarizing the data from the 2010 MSU Winter Dairy Meetings.
Milk Market Update & Reflections on 2009

Christopher Wolf
Dept. of Agricultural, Food and Resource Economics

Milk Market Update

We all know that 2009 was an historically bad year for US dairy farms. Preliminary financial data from Michigan dairy farms start to put it in perspective. Table 1 shows summary information from the Michigan dairy farm business analysis summaries. Even though 2009 is preliminary, the values likely will not change a great deal in the final version.

Over the 9 years the average rate of return on assets (ROA), a measure of profitability, averaged 5.8%. 2001, 2004 and especially 2007 were profitable years, while 2002 and 2003 were very poor.

Last year looks to set the new low water mark for profitability with a negative average ROA. Compared with 2008, average milk price received fell $6.16/cwt while total feed costs dropped only $1.16/cwt.

Table 1. Michigan dairy farm financial summary statistics, 2001-2009*

<table>
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<tr>
<th>Year</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
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<th>2006</th>
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<tr>
<td>ROA (%)</td>
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<td>4.3</td>
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<td>5.5</td>
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<td>Milk Price ($/cwt)</td>
<td>15.23</td>
<td>12.47</td>
<td>12.59</td>
<td>16.42</td>
<td>15.70</td>
<td>13.44</td>
<td>20.21</td>
<td>19.41</td>
<td>13.25</td>
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<tr>
<td>Purchased Feed ($/cwt)</td>
<td>3.95</td>
<td>3.45</td>
<td>3.56</td>
<td>4.36</td>
<td>4.06</td>
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<td>8.29</td>
<td>9.55</td>
<td>12.54</td>
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<tr>
<td>IOFC ($/cwt)</td>
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<td>5.15</td>
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</table>

*2009 values are preliminary.
1 ROA is rate of return on assets, a measure of profitability.
2 IOFC is income over total feed costs.

While the milk price has recovered to an average price relative to the past 15 years, the milk-to-feed price ratio continues to be near 2.0 as feed prices remain high (Figure 1).

Nationally, milk production increased for a third consecutive month in May. May milk production was estimated at 17.0 billion pounds, 1.1% more than May 2009. Cow numbers in May were 9.103 million. That value was down 171,000 from a year earlier but 4,000 more than April 2010. Regionally, the states in the Northwest (and California) appear to be recovering by posting year-over-year production gains while in the Midwest Wisconsin (+5.8%), Michigan (+4.4%) and Minnesota (+3.8%) continued their impressive growth rate. In the Southwest the story was different as production declined in Texas, New Mexico and Arizona.

While there is still a great deal of total cheese in inventory, stocks grew at a lower than average historic pace last month. International dairy products prices are relatively strong.

In the latest forecast, USDA raised its milk price forecast based on the expectations of higher dairy exports and lower dairy imports.
Elimination of Johne’s Disease...

Continued from Page 15

These findings would imply that in endemically MAP-infected herds, the effort to control the infection will be much more elaborate than what may have been predicted based on introduction of the infection in a dairy herd. This difficulty to fully control MAP appears to be present in many dairy herds in virtually all countries with reported MAP prevalence data.

Summary

Is elimination of MAP from dairy herds fact or fiction? To answer this question we need to consider a number of arguments. The key arguments are that 1) within herd prevalence is much higher than measured using current diagnostic tools; 2) several currently underestimated transmission routes of infection appear to be important for infection maintenance in dairy farms; 3) aggressive test-and-cull based control programs are not economically feasible in modern dairy farms; and, 4) endemically infected dairy herds will need to employ extensive MAP control programs to overcome the impact of backward bifurcation in MAP infection dynamics. Based on these arguments, combined with observed data across all dairy herd populations it appears that MAP elimination from dairy farms is more fiction than fact.

Acknowledgements

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* Full references are available on the web version.

Proactive Plan...

Continued from Page 12

Dairy Educator for some assistance. Several organizations and community colleges offer ongoing group sessions that help walk you through the business planning process. Or you can find some simple-to-use outlines and interactive business planning web sites that can help you to get your farm business plan together: http://www.msu.edu/user/steind/.

Should you not choose to develop a full business plan at least do this:

1. Take a little time from your busy schedule to sit down with your management team and family to talk about what is important.
2. Be sure to put together the vision of where all agree the farm should be in 5 - 10 years.
3. As a business tool to monitor the progress of the farm, build a cash-flow projection for a time frame of 12 to 36 months that considers not only day-to-day expenses but the maintenance and updating of equipment as needed.
4. The lines of communication must be open between all members of the family, management, and ownership by having them contribute to and be a part of the farm’s business plan development.

Fig. 3: The relationship between R₀ and the prevalence of infection in a herd; in this graph a backward bifurcation is presented.

(line A) when infection control measures are implemented (R₀ will become smaller). However, with some endemic infections prevalence will initially not decrease, but remain high despite the reduction in R₀ value to values below the threshold value of 1 (Line B).

Under these circumstances there is a situation possible where there is a high prevalence of infection in a management situation where a new introduction of MAP infection would not be successful (Line C). This phenomenon is defined as backward bifurcation (Figure 3). There are a number of reasons to believe that the backward bifurcation phenomenon is present in the case of MAP infections in dairy herds.

First, environmental contamination and MAP survival in the environment may lead to a backward bifurcation; second, the presence of dose dependency in the likelihood of calfhood shedding status and the subsequent increased rate of development into a super-shedder also will result in a backward bifurcation.

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