The calving pen is one of the most strategic locations on the farm. The four objectives of good calving pen management include:

- comfort and low stress for the dam,
- low health risk to dam and calf,
- opportunity for seclusion by dam, and,
- convenience for people working with the cow and calf.

There are various ways to achieve those objectives. Access to clean, dry pasture is the oldest option that farmers have used and is still ideal during times of the year when weather is favorable. But as we’ve moved cows inside on many dairy operations we’ve tried to keep the best features of pasture and add convenience to monitor calving and the ability to feed and water them.

Traditionally, we have recommended individual calving pens as the preferred maternity facility. Calving in individual pens makes it easier to work with the dam and to reduce the opportunity for both the cow and the calf to be exposed to manure-borne pathogens from other cows.

Cows may be in the calving pen anywhere from a day to a week. In cases like this, designing pen layout and managing for access to fresh feed and water is important. Another factor to consider when cows are in individual calving pens for an extended period of time is the isolation of these social animals away from herdmates and the potential impact of that on fresh cow performance.

As Farms Get Larger...
A disadvantage of individual calving pens can be the number of pens and space it takes for a large herd. According to Cook (2007) in “Makin’ Me Dizzy - Pen Moves and Facility Designs to Maximize Transition Cow Health and Productivity”, a 1,000-cow dairy will average 20 calvings per week, with a range of 10 to 45. To accommodate 90 percent of calvings, the author estimates pen requirement as 140% of average weekly calvings. If a producer planned facilities based on this estimate and kept cows in pens for an extended period of time, this would mean dedicating more than 4,000 sq ft of pen space for calving at approximately 144 sq ft/pen.

Some farms use group calving pens with less than the proportional space. While recommended space for group maternity pens (Graves et al., 2005) is 175 to 200 sq. ft/cow, some farms have pens sized for far fewer than the 140% of weekly calvings. While this reduces the building space, the basic principles of maternity pens including opportunity for seclusion by the calving dam and reduced risk of exposure to manure for both the dam and the calf still apply. Therefore, management becomes even more critical in a group calving pen and potential risks are greater.
To mitigate risk in group calving pens and to lessen the space demand of individual pens, as well as to improve calving performance, some farms are moving cows into calving pens later in the calving process and keeping them in the pen for a shorter length of time.

**Length of Time in Calving Pen**

One farm used to move cows from a freestall close-up group to individual calving pens when they noticed the birthing process started. However, they experienced too many cows that would stop progress towards parturition after the move and as a result required intervention and, frequently, pulling of calves. Maybe this was due to the activity level around the herdsman’s office, located near the calving pens. But, whatever the reason for the interruption of calving, something needed to change.

On this farm, they changed when they moved dams into the maternity pen, waiting until the cow was much further along in the calving process. Now when they move them, cows are seemingly past the point of no return in calving and usually calve within an hour and without assistance.

This type of system like that depends on frequent observation (every 20 minutes around the clock) of the close-up dry cow pen, and knowledgeable and committed employees to move animals at the optimal time.

This system also de-emphasizes feed availability in the calving pen because it is used for such short periods of time. That can be an advantage in logistics. Cows on this farm are in the calving pen generally for only 1 to 2 hr.

Based on short occupancy in calving pens, researchers from Kansas State University and Double A Dairy of Jerome Idaho, recommend sizing calving pens for 70 percent of daily calvings with a minimum of 2 pens. Using a 1,000-cow dairy as an example, an average 90th percentile of 28 calvings per week, would equate to 3 calving pens.

**Importance of a Commitment to Observation**

Whatever system is used, it is essential to reduce the incidence of cows calving in a freestall scrape alley. The exposure of these calves to manure-borne pathogens is considerably greater and the environment less hospitable. Farms that routinely have employees monitor this group, are able to keep that occurrence to less than 3 percent of calvings.

**Access Provided for Self-Seclusion**

Another producer, with a smaller herd and less help, takes advantage of the calving cows’ natural inclination to go off by themselves to calve. In their barn, the freestall area for close-up dry cows is adjacent to the straw-bedded pens for calving, with only a short gate in-between. During the day, they move dry cows that appear ready to calve from the free stall area into the straw pen. At night, they simply open the gate between the two areas and cows that calve during the night naturally seek that area in which to calve. This producer report that as long as they don’t neglect to open the gate at night calves are not born into the scrape alley.

**Managing Pathogen Exposure**

Even cows that calve in individual stalls are often exposed to pathogens. Calving pen cleanliness is important to the uterine health of the calving dam. Generally, cows that get a uterine infection became infected in the calving pen.

In addition, the newborn calf is exposed to pathogens when it is very vulnerable due to its undeveloped immune system. Calving pens sampled in an environmental study on Michigan Johne’s Disease Control Demonstration Project farms were found to be contaminated with the pathogen that causes Johne’s Disease, 17% of the time. This was on farms where there was an awareness of disease transmission, a knowledge of some of the infected animals, and a commitment to reduce herd prevalence. And yet it still occurred.

Manure can be left on gates dividing pens and stay there long past the contributing cow’s residency. Cows in neighboring pens may spread manure through gate dividers and bacteria may survive on the floor or walls. Producers must work to reduce exposure, but elimination of all pathogens is not attainable. Therefore, removing calves from calving pens...
as soon as possible after they stand reduces the opportunity for exposure.

Because the animals at greatest risk of infection and development of Johne’s Disease are newborn calves, having a separate pen for dams identified as Johne’s test-positive can reduce the risk to the majority of calves born in the herd. That pen should be separated from others if possible and be at the end toward which pen manure is scraped so that risk of contamination of “clean” pens is reduced.

Health of Calves Born in Individual Pens vs. Group Pens
Management is the key to making any system successful. Pithua et al. (2009) evaluated the prevalence of calf diarrhea, respiratory disease and morbidity attributable to any cause in calves that were born in individual calving pens, cleaned between each calving, and calves born in group calving pens. All calves were separated from the dams within 2 hr of birth. Calves were evaluated through 90 days of age.

The risk of diarrhea, pneumonia and morbidity due to any other cause was not significantly different between calves born in single-cow vs. multiple-cow calving pens. This study does not mean that there isn’t potentially greater risk to multiple cow pens, but that it can be managed.

Importance of Close-up Pen Space
While this article focuses on the maternity area itself, the performance of the dam is also highly impacted by crowding and cleanliness in the close-up dry cow pen. Whether a pack pen or freestalls, these animals are very sensitive to overcrowding. Overcrowding should be avoided at all costs. It is a major factor in both fee space availability and cleanliness. A socialization factor also is at work when new animals are added to the pen on a routine basis.

In regard to socialization, one producer loads pens with pregnant cows 2 to 3 weeks prior to expected calving and then does not bring any new animals into that pen thereafter. This controls both socialization and pen density. Cows leave the pen soon after they calve.

Summary
There is no one best answer for calving pen system. It depends on space and labor constraints on each farm. However, each system requires a high level of management of this critical time for both dams and calves. Keeping the four main objectives in mind, training employees to provide consistent and prompt care, and evaluating the results for both cows and calves will help to achieve a high level of performance in the calving pen. (MDR)

Do you get MDR publication and other notices in electronic form via your email?

It’s quick and user-friendly and we invite you to switch.

Send your email address to: mdr@msu.edu and we shall sign you up.

References for all articles are available only in the online version at www.msu.edu/user/mdr/.
Intensified Feeding Programs for Calves: Are They Worth the Cost?

Miriam Weber Nielsen and Mike VandeHaar
Dept. of Animal Science

Dairy Nutrition and Management

Introduction

Intensified feeding of calves for accelerated growth is a hot topic in calf management. These programs involve feeding of more milk replacer than in conventional programs, such that calves consume about twice as much dry milk replacer solids. One advantage of these programs is to enable heifers to grow to breeding size earlier. Disadvantages include increased costs for milk replacer and increased attention needed at the time of weaning to ensure adequate consumption of dry feed. Our research supports the idea that intensified feeding programs will not impair future milk production and will provide sufficient returns to pay for the additional investment in milk replacer.

Milk or milk replacer is the major nutrient source for calves for about the first 3 weeks after birth. Because the calf’s digestive system is not yet mature enough to digest grain efficiently, growth and maintenance needs must be satisfied by milk intake. Traditional milk-feeding programs for heifer calves were designed to provide nutrients for limited body growth along with maintenance. Because of the cost and labor involved, the main goal of the pre-weaning period has been to facilitate transition of calves from milk to dry feed (calf starter). Traditional milk replacers contained 20% crude protein and 20% fat, and yielded body weight gains of less than 1.0 lb/day. Research in Israel in the 1990’s demonstrated that calves consuming whole milk gained weight faster, and produced more milk as cows. This knowledge stimulated the development of new milk replacers that would promote growth similar to that possible with whole milk feeding.

Intensified Feeding Programs

Intensified feeding of calves involves feeding approximately twice as much milk replacer powder (2 to 2.5 lb/day) as traditional feeding programs (1 to 1.25 lb/day). The milk replacers contain 25 to 28% crude protein to support the potential of young calves for rapid lean growth, and 15 to 20% fat. Unlike traditional programs, milk replacer is fed in increasing amounts as calves grow older. Calves are fed about 1.25 lb of powdered milk starting with the first feeding after colostrum feeding, and amount fed increases to around 2 lb/day before weaning. Milk replacers also are fed at a higher concentration of the liquid mix (15 to 17% solids) than are traditional milk replacers (13%). Because calves are consuming more milk, gradual weaning is important to provide time for calves to gradually increase their consumption of calf starter to avoid a growth slump after weaning.

Calf Starter

Traditional calf starters contain about 18% crude protein on an as-fed basis. Starters used in accelerated growth programs may contain 22% crude protein, to help achieve optimal growth. As with traditional programs, calves should be consuming 2 lb of starter per day for at least 3 days before weaning.

After Weaning

Calves on accelerated programs should be fed calf starter with higher crude protein content for several weeks after weaning. By the time of weaning, Holstein calves on accelerated programs will be about 2 inches taller and 25 to 30 lb heavier than calves on traditional programs. If weaning is difficult and calves do not maintain their growth rates, the advantage in body size of the accelerated program will be lost in the first 1 to 2 months after weaning.

Potential Pitfalls

Intensified feeding programs are not for everyone. Excellent calf management is required to benefit from their use. Amount of milk replacer fed to calves must be increased with age, which requires additional management and communication with calf feeders. As with traditional programs, inconsistency in mixing and feeding can produce digestive upsets. Starter intake is important for ru-
Right to Farm: Site Selection for New and Expanding Dairy Farms

Roberta Osborne, Extension Dairy Educator
Gerald May, Extension Air Quality Educator
Steve Mahoney, Michigan Dept. of Agriculture and Rural Development

Introduction

Have you built a new livestock barn since June of 2000 for herd expansion? Do you have plans to build a new manure storage unit in the near future? We ask these questions because dairy producers need to understand how following the Generally Accepted Agricultural and Management Practices (GAAMPs) for Site Selection and Odor Control for New and Expanding Livestock Production Facilities (Siting GAAMPs) maintains the protection from nuisance lawsuits provided by the Michigan Right to Farm Act. Farms that move ahead with construction projects without first getting Michigan Department of Agriculture and Rural Development (MDARD) site verification risk losing the protections provided by the Right to Farm Act and in some cases may be forced to shut down the facility.

Major Changes in the Farm Act

The authority for these GAAMPs and the preemption of local ordinances that extend or conflict with GAAMPs, were the two major changes made when the Michigan Right to Farm Act (PA 93 of 1981, as amended) was amended in 1999, and gave MDARD the authority to oversee the site selection process. The Michigan Ag Commission approved the first set of Siting GAAMPs in June of 2000. As recently reported in the Right to Farm Program Fiscal Year Report 2010, since June 2000 a total of 335 farms have utilized the Site Selection GAAMPs in choosing the best site to construct new or expand existing facilities. These GAAMPs provide a planning process that can be used to properly plan new and expanding facilities, increase the suitability of a particular site and enhance neighbor relations. Key aspects of the site selection process include:

- Determining the appropriate property line setback by identifying the number of non-farm houses near the proposed site.
- Identifying non-farm residences within the MI OFFSET odor footprint.
- Documenting that manure storage has been designed and constructed according to acceptable standards.
- Determining that manure produced by the expanded/new herd is appropriately utilized through land application or other processes.

These and other site verification requirements are contained in the MDARD Site Verification Checklist available at: http://www.michigan.gov/documents/MDA_SitingChecklist_116499_7.pdf.

The MDARD’s review and approval of the construction project is required when the size of the facility at the end of the project exceeds predetermined size limits based on the number of animal units housed at the site. Category is determined by the number of non-farm residents within a given distance of the site and the distance is determined by the number of animal units housed at the proposed location. Below is an example of one table in the GAAMPs. As the number of animal units housed at the site increases so does the perimeter around the facility where non-farm residents are counted to determine the site category, the property line setbacks increase, and the need for MDARD site review and verification is required.

<table>
<thead>
<tr>
<th>Total Animal Units</th>
<th>Number of Non-Farm Residences within Distance</th>
<th>Property Line Setback</th>
<th>MDARD Site Review and Verification Process Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 - 499</td>
<td>0 - 5 within ¼ mile</td>
<td>250 ft.</td>
<td>Upon producer request</td>
</tr>
<tr>
<td>500 - 749</td>
<td>0 - 5 within ¼ mile</td>
<td>400 ft.</td>
<td>Yes</td>
</tr>
<tr>
<td>750 - 999</td>
<td>0 - 5 within ½ mile</td>
<td>400 ft.</td>
<td>Yes</td>
</tr>
<tr>
<td>≥ 1000</td>
<td>0 - 5 within ½ mile</td>
<td>600 ft.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Additional tables in the Site Selection GAAMPs cover Categories 1 and 2 sites for new and expanding operations and are similar to the sample shown above. The setbacks vary depending on whether it is a new facility or an expansion. Each table has its own set of standards for non-farm residents, property line setbacks, and the requirement for MDARD site
Treatment of Milk House Wash Water on a Small Dairy

Steven Safferman  
Dept. of Biosystems and Agricultural Engineering  
Lloyd Rozema  
Aqua Treatment Technologies, Grimsby, Ontario, Canada

Introduction

Milk house wash water is produced from the cleaning and sanitization of milk containers and milking equipment. Incidental manure also enters the water. This water may contain high levels of carbon, measured as chemical oxygen demand (COD), phosphorus, nitrogen, and other pollutants that if not properly removed or assimilated in the soil can contaminate surface and ground water. Small dairy farms face the challenge of efficiently and effectively treating this wash water.

Vertical flow constructed wetlands have the potential to reduce COD and nutrients by using both aerobic and anoxic environments in different cells. However, during cold weather ice formation on the surface of the wetland inhibits treatment. A unique design variation has two vertical levels of flow distribution. During warm periods flow is discharged on the surface to irrigate the plants. In winter, the flow is applied below the surface to prevent ice buildup.

The objective of this research was to determine the effectiveness of a vertical flow constructed wetland with dual flow distribution (VFW) to treat milk house wash water.

Wetland Design

The VFW was designed by Aqua Technologies, Ontario Canada, and Michigan State University. The system was installed at a small dairy farm in Ingham County, Michigan, that milks approximately 30 cows, 2 to 3 times corresponding to a wash water flow of 200 to 280 gal/day.

Installation was completed by Aqua Technologies, Michigan State University, and the owner of the farm.

Figure 1 shows a plan view of the VFW. Each cell is 16 ft wide by 16 ft long and 4 ft deep. The cells are lined with a water tight membrane (Figure 2). Pea gravel was used as the media because of its high porosity to minimize the potential for clogging. The initial vegetation consisted of Irish Virginica and Spartina Pectinata (cord grass), in approximately equal quantities. Vegetation helps keep the media open and provides oxygen in summer when it is needed the most because of the high rate of microbial degradation and the low solubility of oxygen in the water.

Figure 1: Schematic of the vertical flow constructed wetland.

Figure 2: Empty VFW cell lined with drainage tile to collect percolated water.
Milk house wastewater first enters a 500-gal septic site where solids settle and scum floats. The water then proceeds to the influent pump chamber where it is mixed with recycled effluent water from cell 1. Dosing into cell 1 is controlled by a level switch. During warm weather the water is dosed to the surface of each of the cells of the VFW (Figure 3). In colder seasons, flow is subsurface discharged, approximately 18 inches below the surface, so that freezing does not occur. Water percolates through the media to the bottom of the cell where it enters a drainage tile which allows it to flow to the cell’s effluent sump (Figure 2). A pump moves the effluent back to the influent pump chamber and another pump, operated by a level switch, moves excess water to cell 2. This cell is designed to remove most of the carbon (as measured by chemical oxygen demand) and nitrify ammonia to nitrate. The second cell is kept saturated by the use of a riser in the effluent pipe before the water falls into the effluent sump. Water is not recycled.

As in cell 1, water is collected, transported through the riser into the effluent sump, and pumped to cell 3. This cell transforms the nitrate into nitrogen gas (denitrification). The third cell polishes the water, primarily removing excess carbon to very low levels. A pump in the effluent sump operates on a level switch to both recirculate part of the water back to the cell 2 effluent sump (which also serves as the influent sump for cell 3) and the balance to a drain field. The distribution is controlled by a valve on the recirculation line. All pumps are rated at 1 quarter horsepower. The drain field is 32 ft long and 16 ft wide with an approximately 2 ft bed of pea gravel (Figure 4 on page 8).

**Performance**

Effluent COD levels were very low through the entire one year project period (Figure 5 on page 8). The “Septic Tank” designation is the water from the effluent end of that tank before dilution with cell 1 recirculation water. “Cell 1” and similar represent the effluent from that cell where “Cell 3” is the final VFW effluent before the drain field. The average VFW effluent concentration was 59 mg/L/gallon with a standard deviation of 87 mg/L. Most was removed in cell 1. These values were highly skewed by a surge in mid-March resulting from the need to dump a bulk tank of milk into the septic tank. The septic tank was ultimately pumped a few weeks later because of the accumulation of floating fats but, as shown, the VFW proved to be resilient as effluent levels did not rise significantly.

Very high reductions of ammonia levels resulted with an average effluent and standard deviation levels of 1 mg/L N and 1 mg/L N, respectively. Nitrate shows high unexplained influent and effluent variability but still excellent performance. The average value was 5 mg/L NO\textsubscript{3} with a standard deviation of 5 mg/L NO\textsubscript{3}. Nitrate removal generally occurred in cell 2, as anticipated because this cell contained the microbial environment that encouraged denitrification.

Phosphorus (P) removal proved to also be very good with an average effluent level and standard deviation of 6 mg P/L and 4 mg P/L, respectively. This removal is not likely to be sustained as the mechanism is sorption to the pea gravel which generally has a low sorption capacity.

**Conclusion**

The VFW showed excellent, sustained performance for over 1 year, including over winter and when a bulk tank of milk went through the system. During this time period, the only mainte-
nance directly associated with the VFW was to switch the level of flow distribution. Although the septic tank was pumped out, this likely resulted from the addition of milk.

The approximate cost of the VFW, including the drain field, was $19,000. Labor was the largest component followed by pea gravel media. The very low levels of pollutants in the effluent indicate that the size of the system could likely be reduced because the treatment potential of the drain field was not fully utilized. Further research to develop such a design and monitoring of the existing system is warranted.

Two other systems currently are operating satisfactorily at milking facilities in Canada, one of which has been on line for over 3 years.

“Vertical flow constructed wetlands have the potential to reduce COD and nutrients by using both aerobic and anoxic environments in different cells.”

Figure 4: Drain field under construction.

Figure 5: Chemical oxygen demand (mg/L) as related to calendar date.

Acknowledgement: Funding was provided by the Michigan Milk Producers Association and Aqua Treatment Technologies.
Diagnostic Tests and Strategies to Control BVDV in Dairy Operations

Dan Grooms
Dept. of Large Animal Clinical Sciences
College of Veterinary Medicine

Dairy Health

Clinical diseases in cattle resulting from infection with bovine viral diarrhea virus (BVDV) are recognized as being responsible for economic losses throughout the world. Economic losses are caused by decreased performance, loss of milk production, reproductive wastage, and increased risk of morbidity and mortality. Because of increased awareness of the significant impact that BVDV can have, efforts to control this virus are increasing. As we learn more about BVDV, there also is an increasing realization that successful control of this virus requires a strategy that involves multiple components and is customized to fit the goals and capabilities of each producer. By developing a complete program, the risk of BVDV associated losses can be reduced significantly.

The tools available for controlling BVDV include 1) a multitude of diagnostic tests and strategies for detecting both acute and persistent infections, 2) vaccines available in a variety of combinations with other important disease-causing pathogens, and 3) biosecurity practices. Although this article focuses on diagnostic tests and strategies, it should be noted that using one tool (e.g., diagnostics) without using others could result in an inefficient BVDV control program.

<table>
<thead>
<tr>
<th>Reason For BVDV Testing</th>
<th>Suggested Diagnostic Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis of acute infection including: Sick animals Dead animal Abortion</td>
<td>Virus isolation from tissues, serum or whole blood, preferably tissues that have high concentrations of lymphoid cells including Peyer’s patches, ileum, spleen, thymus (fetus), lung, liver. PCR from tissue, serum or whole blood.</td>
</tr>
<tr>
<td>Detection of persistently infected (PIs) calves younger than 4 months of age.</td>
<td>PCR on pooled skin samples Skin IHC Skin ELISA SNAP® BVD test.</td>
</tr>
<tr>
<td>Detection of PIs calves older than 4 months of age.</td>
<td>PCR on pooled skin samples Skin IHC Skin ELISA Blood (serum) ELISA SNAP® BVD test.</td>
</tr>
</tbody>
</table>

BVDV Diagnostics Assays and Strategies

Choosing and applying the appropriate BVDV diagnostic test and strategy requires a firm understanding of the disease pathogenesis. Without this understanding, proper interpretation of test results is difficult. It is important to either develop a good understanding of BVDV or work with an animal health professional who understands the complexities of the virus.

BVDV diagnostics are used for essentially two reasons (Table 1). The first is to identify if BVDV is the cause of or part of a clinical problem that has been identified. A variety of diagnostic assays are available for identifying virus in blood or nasal swab samples taken from sick animals or tissue samples taken at necropsy. In addition, detection of an immune response to BVDV (antibody titers) can be useful in situations where previous information about an animal’s immune status is available.

The second use of BVDV diagnostic assays, and the most important use in a BVDV control program, is for the identification of cattle persistently infected with BVDV, or PIs. Cattle that are persistently infected with BVDV continuously shed large amounts of virus and serve as the major mechanism to spread the virus in the cattle population. PIs are infected with and shed BVDV for their entire life. By identifying and eliminat-
ing PIs, the risk of BVDV transmission within and between farms is reduced significantly. Persistently infected cattle can be identified by detecting virus in either blood or tissue samples. Again, a variety of assays have been developed that can be used to detect PIs.

Currently, the most commonly used sample for identifying PIs is skin. A small notch of skin, often taken from the ear (but can be taken from anywhere), can be submitted to diagnostic labs where different tests can be used to detect virus. Blood also is commonly used to identify PIs. Any animal testing positive should be isolated and retested within 3 weeks before being classified as a PI. With the development and refinement of new technologies, such as pooled PCR, the cost of screening large numbers of animals has been reduced significantly, making it increasingly practical for producers to routinely include PI testing in their BVDV control program. A summary of currently available tests can be found in Table 2 on page 21.

**Real Life Scenarios**

There are a variety of different BVDV testing strategies that have been developed and promoted. In the end, the strategy that you use depends on your goal, your management capabilities, economic considerations specific to your operation, and which tests are available. A good way to look at different BVDV testing strategies is to start by defining what it is you are trying to accomplish. Let’s look at several “scenarios” that are common to US dairies and discuss some possible solutions.

**Scenario 1:** Is BVDV causing a clinical problem? In this scenario, we are interested to know if BVDV is causing an animal or animals to be sick or is involved in the death of an animal. In this case, we are interested in identifying BVDV during an acute infection in a live animal or at necropsy. We want to submit samples to a diagnostic lab that is capable of detecting virus using virus isolation or PCR. Whole blood keep are the samples of choice for detecting acute infections in live animals. Other appropriate samples include nasal swabs and blood serum. At necropsy, lymphoid tissues are the first choice for detecting BVDV. These would include Peyer’s patches and/or ileum in the small intestine, regional lymph nodes, and spleen. Other useful tissues depending on the clinical presentation include lung, liver and kidney. If you are dealing with an abortion, include thymus tissue.

**Scenario 2:** Is BVDV circulating in my farm? This is a common question asked when BVDV is thought to cause underlying chronic herd health or reproduction problems. In this case, we want to make a diagnosis at the herd level. This in turn may lead to the development of a strategy of looking for individual PIs (see scenario 3). There are a couple of strategies that can be used to “screen” herds for BVDV. The first is to screen bulk milk samples for BVDV using PCR. Bulk milk PCR can detect about 1 PI in approximately 300 cows, although there may be some variability in this depending on how much virus is being shed in the milk of a PI. For larger farms, this strategy can be accomplished using inline milk samplers. The problem with bulk milk testing is that it only detects in lactating cows, young stock are not evaluated.

The reality is that most PIs are in the replacement herd, not in the milking herd. Regardless, if the bulk tank PCR is positive, this is a significant finding and virus is likely circulating in the farm. If it is negative, it does not rule out BVDV from still being present. Another strategy is to test sentinel (indicator) animals for the presence of BVDV antibodies. The best sentinel animals are young stock (heifers, bulls, steers) between the ages of 6 months and 1 yr that have NOT been vaccinated for BVDV.

The idea is that if they have high antibodies to BVDV, and they are older than 6 months of age, and they have NOT been vaccinated, then the antibodies are due to natural exposure to circulating BVDV. The accuracy of this method increases if you: 1) use more animals (we typically recommend 5-10); 2) they are closer to 6 months than 12 months (younger animals with titers suggest more recent circulation of virus); and, 3) if they have exposure to lots of animals on the farm (sentinels only reflect the animals they have had contact with). A final way to continuously screen the herd for BVDV is to routinely have dead animals and abortions examined by a veterinarian and have appropriate samples submitted for diagnostic testing.

**Scenario 3:** We know BVDV is here, now we want to find the PIs. This is the most common BVDV testing that occurs today -- find the PIs so that we can get rid of them. To accomplish this, we must use a test that actually detects the virus in the animal. This can be virus isolation, PCR, antigen capture ELISA, SNAP® BVD test or Immunohistochemistry
(IHC). All of these tests have been used successfully. Antigen capture ELISA and PCR are most commonly used today because they are most adaptable in the laboratory for testing large numbers of samples. PCR can be used on a pooled sample which helps to further reduce the cost. However, there is controversy among investigators as to what is the correct pool size. Too many samples and the sensitivity of the assay may go down. Fewer samples means higher per animal costs. At the Michigan State University Diagnostic Center for Population and Animal Health (DCPAH), we use pools of 10. We feel this pool size gives us the best sensitivity while still maintaining a reasonable per animal cost. Samples that can be used include blood or tissue. Skin samples are most commonly used and they are often taken from the ear - thus the “ear notch test” - but please note that skin can actually be taken from anywhere on the body.

Skin can be tested with IHC, PCR or ELISA. Blood can be tested with PCR, ELISA, SNAP® BVD test or virus isolation. One caution with blood, in very young calves (<4 month of age) a whole blood sample must be used instead of serum. The reason for this is that maternal antibodies will neutralize virus in serum. Once maternal antibodies wane (around 4 months of age), virus will begin reappearing in serum. With whole blood, white blood cells can be isolated and tested which eliminates the issues of maternal antibodies.

The next decision is what animals to test. This answer often comes down to how fast you want to screen the herd and what are your management capabilities. The most cost-effective way to screen a herd is to test replacement animals or any adult animal if the farm does not have replacement animals. The idea here is that when you test a young animal, its BVDV status gives you information about its mother. If a calf is negative (i.e., NOT a PI), then its dam CANNOT be a PI. If a calf is positive and determined to be a PI, then its dam MIGHT be a PI and needs to be checked. If a dam does not have a replacement on the farm (e.g., she has given birth to all bulls), then you need to check her as well. This strategy allows you to really get two animals tested for the price of one. The caveat here is that you need to be able to match calves with their dams - something that is not always easy. If you cannot do this, then you are left with testing all animals on the farm. If you have limited resources, focus on the young stock because that is where PIs are most likely to be.

Even if you test everything that is walking around on the farm today, you must keep in mind there is another susceptible population that has yet to hit the ground - the gestating fetuses. So to be complete, you need to continue to test newborn calves. We recommend continuing to test newborns for a minimum of 9 months to ensure there are no hidden fetal infections that may lead to the birth of a future PI.

Scenario 4: I am expanding and want to reduce the chance of bringing BVDV onto my farm? Here is the basic recommendation: isolate the new animals. Collect a sample (skin, blood) and screen for BVDV as soon as possible. If pregnant, you will need to screen the calf when it is born as well. The alternative is to buy BVDV test-free animals.

Scenario 5: I have an animal that was positive on a virus detection test - now what? If you are searching for PIs and a test comes up positive, then you have a decision to make. 1) Isolate the animal and retest in 2-3 weeks to confirm that the virus is still there, thus confirming a “persistent infection”, or 2) assume the animal is a PI based on one test and eliminate it from the herd. Here is the deal - when a virus detection assay turns up positive, the majority of the time, that animal turns out to be a PI. However, if you happen to test an animal that is undergoing a transient infection and you collect the sample at the right time, all of the virus detection tests could potentially detect virus. This is rare, but it does occur. Our recommendation is to isolate and retest 14-21 days after the sample for the first test was taken, especially if it is a valuable animal.

Scenario 6: I want to market cattle as BVDV PI free? In this scenario, we need to use a test that actually detects virus in the animal. This can be virus isolation, PCR, antigen capture ELISA, SNAP® BVD test or IHC. Antigen capture ELISA and PCR are most commonly used today. Blood also can be tested with PCR, ELISA or virus isolation (note the cautions about testing blood from young animals discussed in scenario 3). The IDEXX SNAP® BVD test is useful in that it is a cow-side test and can be used to rapidly screen an animal prior to a sale.
What Do Landowners Need to Look For in Oil and Gas Leases?

Curtis Talley, Jr.
Extension Business Management Educator

Landowners who have never dealt with leasing their mineral rights for oil and gas production, upon reading a lease, may find that they have difficulty understanding the lease language in layman’s terms. Are there key words or phrases that someone should be aware of? This article discusses the language from leases utilized by the oil and gas industry that are offered to landowners. For instance, when the word “company” is stated, it is referring to the oil and gas company that is interested in leasing a landowner’s mineral rights [it is not to keep you company].

When you, as a landowner enter into a lease negotiation with the intent to sign an oil and gas lease, you should be expecting eventual drilling and production on your property. If you do not support the drilling of wells on your property, then signing a lease is not fair to the oil and gas company and can leave you in a bad situation. Sometimes, an oil and gas company will negotiate a lease for the mineral rights and pay the bonus, but never actually drill. Do not expect this, as it may lead to a poor lease agreement and negative outcomes. Expect that drilling will take place and all parties will use the terms of the lease to conduct exploration and production.

Have Your Eyes Open
The company writes the lease and provides the landowner the opportunity to review it and accept its terms. In general, no matter what you are leasing, whether it is a car, agricultural machinery or mineral rights, the party that writes the lease usually has the advantage because they can include terms and conditions that are favorable to them. It is up to the other party to identify unfavorable terms and request that they be modified.

In the case of mineral rights, one of the company’s goals is to keep the land under lease as long as possible. This avoids potentially losing the land to a competitor or negotiating new lease terms with the requirement that another bonus payment be made. Most leases have automatic renewal or extension clauses that keep the lease active with minimum actions being made by the company beyond the primary 3- to 5-year period.

Some Key Phrases and Terms

1 “Exploring by geophysical and other methods…” This allows the company to conduct seismographic studies to determine if drilling an oil and gas well should be considered. If the lease does not specifically call for the payment of surface damages for this activity, the landowner may not receive any surface damage payments when seismic work is conducted.

2 “Together with all rights, privileges or easements useful or convenient…” This denotes unpaid usage of the land surface and allows the company to place roadways, pipelines and have other unnamed “privileges” wherever it is convenient for the company. The landowner can limit the activities that are unpaid and require payment for, or not allow certain activities.

3 “… Or any other land adjacent or appurtenant there to…” This is called the Mother Hubbard clause and permits the company to obtain the right to develop all contiguous or “appurtenant” lands owned by the landowner or that the landowner may own in the future. These can be adjacent, or they can be located in another township. Sometimes, landowners prefer to not lease all of their land. If the landowner accepts this provision, he/she is not reserving the right to negotiate a separate lease to the additional property in the future.

4 “… Establish and utilize wells and facilities for the disposition of water, brine or other fluids…” This gives the company permission to dispose of these items on your land including the construction of an injection well. Because this condition is contained in the granting clause portion of the lease, there is no provision to pay the landowner for the usage. Alternatively, the lease can state that prior written consent of the landowner is needed for the construction and location of such sites. In order to obtain the land-
owner’s consent, a separate lump sum, annual lease or right of way payment may be negotiated.

5 "...And construct tanks, power and communication lines, pump and power stations and other structures and facilities." This allows the company to construct such things as compressor stations and other buildings or facilities on the land surface with no payment to the landowner. Alternatively, the lease can state that prior written consent of the landowner is needed for the construction and location of such facilities. In order to obtain the landowner’s consent, a separate lump sum, annual lease or right of way payment may be negotiated.

6 "...Located on said land or lands pooled or unitized ..." Pooling is the company’s right to consolidate your leased premises with adjoining tracts of land. Sometimes pooling arrangements are necessary to meet the minimum acreage required to obtain a drilling permit. For example, you have a 20-acre tract and your neighbor has a contiguous 20-acre tract. For this particular well, the oil and gas company is required to have 40 contiguous acres under lease. The pooling provision allows the company to combine the two tracts into a 40-acre pool so they can obtain a drilling permit. Pooling also can be used to extend the lease beyond the primary term, even if land in the lease is not producing a royalty. Even though the lease may state it has a 3-year or a 5-year primary term, it can be extended without the landowner’s consent if pooling language allows it. Many leases contain multiple paragraphs that discuss the company’s rights to pool. Many pooling clauses will operate to extend the entire leased premises even if only a portion of the lease is located within a unit that is paying the landowner a royalty. Alternate language is to only allow pooling to the extent it is needed to secure a drilling permit.

7 "...This lease shall remain in force for a primary term of 3 years ....and in no event shall this lease terminate unless production of oil and or gas has permanently ceased.” This means that even though you are not being paid a royalty, if the well on your land or on land that is pooled or unitized with your land is capable of producing any oil or gas, even if it is not enough to market profitably, the primary term of the lease will continue. Landowners may assume that when the lease states a primary term of 3 years, if there is no well present or a royalty being paid that the lease will terminate. Pooling and shut-in well language can be written so that the lease continues even though the landowner is receiving no royalties.

8 “Company shall sell the oil and gas and pay Lessor 3/16 of the net amount....minus post-production costs incurred by Company.....to realize the market value...” In Michigan, rule 324.61503b of the Michigan Oil and Gas Regulations forbids the oil and gas company from deducting post-production costs unless they are agreed to in a lease. Post-production costs can reduce significantly the royalties paid to a landowner because these deductions are calculated and charged by the company. It is not uncommon to see several paragraphs in the lease that discuss the list of possible deductions including “any and all other costs and expenses of any kind or nature......between the well head and the point of sale.” Alternatively, the landowner can require that the company pay to him/her the agreed upon royalty percentage based on gross proceeds at the well head, free of any expenses, with the exception of severance taxes.

Conclusion
Before any exploration can begin, the landowner and the oil company must agree to the terms regarding the rights, privileges and obligations of the respective parties throughout the exploration and production stages. Negotiation of these terms may be a landowner’s first exposure to an oil and gas lease. Because of the complex legal nature of the leasing process, novice landowners may be at a disadvantage when dealing with an experienced landowner or oil company. An oil and gas lease is both a contract and a conveyance of an interest in land. When you sign an oil and gas lease, you have essentially “sold” a part of your property. Obtaining a good lease is a negotiation, with the goal that it be a win-win situation for both parties. To obtain a good lease it may take a long time and it is worth it because leases can last a lifetime.

Negotiation of an equitable lease requires the assistance of an experienced oil and gas attorney or oil and gas leasing consultant. It is not advisable to sign a lease if your understanding of the provisions is not clear.

For more information regarding oil and gas leasing you can contact Curtis Talley Jr. at 231-873-2129. Michigan State University Extension also has a web site www.msue.msu.edu/oilandgas that has additional information to assist landowners in understanding and negotiating oil and gas leases and the oil and gas industry in general.
Livestock Gross Margin Insurance for Dairy: [Part 2]*

Craig Thomas
Extension Dairy Educator

The first part of this series (Michigan Dairy Review, October 2011) discussed the basic concepts of Livestock Gross Margin Insurance for Dairy (LGM-Dairy) program and gave an overview of the program’s rules and regulations. This concluding part examines an LGM-Dairy example that illustrates many of the concepts introduced in Part 1.

LGM-Dairy Example

To better understand the rules of LGM-Dairy and how the program works we will consider an example. Let’s assume a producer is going to purchase a contract during the purchase period at the end of September, 2011. The Example Acres Dairy consists of 500 cows averaging 25,200 lb milk sold per cow per year. Using the LGM-Dairy Analyzer v. 2.0 software (available at the University of Wisconsin website - http://future.aae.wisc.edu), feed usage was determined to be 170.4 tons of corn equivalent and 42.6 tons of soybean meal (SBM) equivalent per month. Total monthly milk production was assumed to be evenly distributed across all 12 months with 15% of the herd dry in any 1 month. This results in a total of 8,925 hundred weights (cwts) of milk sold per month.

Let’s evaluate the Gross Margin Guarantee (GMG) for the month of November, 2011. Only 50% of targeted marketings were selected for coverage with a $1.00/cwt deductible. Expected milk price is $17.27/cwt, expected corn price is $7.08/bu, and expected SBM price is $358.90/ton. Recall:

Expected Gross Margin (GM) = expected market value of milk minus expected feed costs.

Then,

\[ GM = (8,925 \text{ cwts milk} \times \$17.27/\text{cwt} \times 50\% \text{ covered}) \text{ minus } [50\% \text{ covered } \times ((170.4 \text{ tons corn} \times \$7.08/\text{bu} \times 35.71 \text{ bu/ton}) \text{ plus } (42.6 \text{ tons SBM} \times \$358.90/\text{ton})] \]

\[ GM = $77,067 - [($21,541) + ($7,645)] \]

\[ GM = $47,881 \]

Now, the GMG must be calculated:

Gross Margin Guarantee (GMG) = GM minus deductible.

In our example, we chose a deductible of $1.00/cwt; therefore,

\[ GMG = $47,881 \text{ - } (8,925 \text{ cwts milk} \times $1.00/\text{cwt} \times 50\% \text{ covered}) \]

\[ GMG = $47,881 \text{ - } $4,463 \]

\[ GMG = $43,418. \]

This same process is used to calculate the GMG for each month for targeted marketings. Keep in mind that a potential indemnity payment exists when Average(AGM) < GMG; therefore, for November, 2011 a potential indemnity payment would exist if the AGM_{November, 2011} is less than $43,418. Also, remember that there is only one GMG and one AGM per contract because contracts are evaluated over the entire contract period. Thus, the producer would have to wait until after the actual prices are available for the last month of targeted marketings (March, 2011 in Figure 1, see page 15) to know if the AGM_{total} is less than GMG_{total}.

In the example (Figure 1), the last month of targeted marketings will be February, 2012 and actual prices for that month will be available in March, 2012.

Alternative to Billings and Payments

Dairy producers have alternatives when it comes to premium billings and indemnity payments. In the month following the last month with targeted marketings (March, 2012 in Figure 1) the producer may choose to receive an indemnity payment if it is due. (In the example, the month following the last month with targeting marketings is March, 2012.) If the total indemnity payment is less than the total premium, the net premium payment can be made at this time and no indemnity payment is received. Even if the producer owes a net premium payment he/she may still choose to receive the indemnity payment in the month following the last month with targeted marketings (March, 2012 in Figure 1) and then wait to pay the entire premium the month following the last month in the contract period (In the example, the last month of the contract is August, 2012 and the entire premium could be paid in September, 2012 in Figure 1).

Producers must file a marketing report to receive an indemnity payment. This report must be filed within 15 days of a notice of a probable loss from their insurance agent. The marketing report
also must be supported by milk sales receipts showing evidence of actual marketings in each month with targeted marketings. In the event total actual marketings are less than 75% of the total of targeted marketings for the insurance period, indemnities will be reduced by the percentage by which the total actual marketings for the insurance period fall below the total of target marketings for the period. There are no limits to milk production covered per year, but annual indemnities are limited to a maximum of 240,000 cwt.

The example contract period (Figure 1) was available for purchase beginning from about 6:00 p.m. Eastern Time (ET) on the last business Friday of September (Sept. 30) until 9:00 p.m. ET the following day (Saturday, Oct. 1). Figure 1 shows that the LGM-Dairy insurance period extends for 10 months, from November, 2011 to August, 2012. Program rules do not allow coverage in the month after purchase (i.e., October, 2011). The producer does not have to insure each of the 10 months, but can vary the coverage to the months desired and also vary the percentage of milk production covered within the months with targeted marketings. In this example, only 4 months have covered or targeted marketings (November and December, 2011; January and February, 2012). Also, in the example the covered months are covered at less than 100%.

The producer in this example chose not to cover March through August of 2012. Because LGM-Dairy contracts can be purchased every month; he could choose to purchase coverage for the months without targeted marketings in the September contract using subsequent LGM-Dairy contracts in the following month(s).

When the rules of the LGM-Dairy program were changed during the first half of 2011, allowing premium payments to be made at the end of the insurance contract period, the program became very popular. Its popularity increased even more when market conditions in the spring of 2011 made LGM-Dairy a very attractive risk management tool. The LGM-Dairy plan was allocated $16.2 million in underwriting capacity for fiscal year 2011 (10/1/2010 to 9/30/2011) and that amount was exhausted during the March, 2011 sales period. The program resumed sales when the fiscal year 2012 began in October, 2011. With the current budget woes in the U.S. it remains to be seen how much and how long this program will be funded.

**Conclusion**

The LGM-Dairy program is a flexible insurance program all dairy producers should investigate. It guarantees a minimum Income Over Feed Costs by establishing a milk price floor (minimum) and feed (corn, SBM equivalents) cost ceiling (maximum). It does not require all milk production and feed usage to be insured; it allows overlapping of contracts; contracts can be purchased every month for up to 10 months into the future; and it provides substantial premium subsidies and a variable deductible. LGM-Dairy is similar to the bundled options strategy which employs milk put options and feed call options, but is much cheaper and more flexible in regards to amounts of milk and feed covered. Its major drawbacks are the short sign-up window, producers must wait for an indemnity payment for a given contract until the month following the last month with targeted marketings in that contract, and a subsidy in any given year disappears when program funds are exhausted prior to the end of a fiscal year.

**Figure 1: LGM-Dairy insurance contract period for insurance purchased in the September, 2011 sales period.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Purchase at end of month</strong></td>
<td><strong>No Coverage</strong></td>
<td><strong>Insurance Contract Period</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Production Coverage</strong></td>
<td><strong>No Coverage</strong></td>
<td>50%</td>
<td>75%</td>
<td>80%</td>
<td>40%</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Social Security Basics For Farmers [Part 2]*

Warren Schauer
Extension Business Management Educator

What about Retirement?

A national poll found that 75% of U.S. workers worry about not having enough money to live comfortably in retirement. This percentage is probably even higher among farmers.

A financial advisor’s rule of thumb to clients is that they will need about 70% of pre-retirement income to live comfortably in retirement. Social Security only replaces about 41% of an average wage earner’s salary.

Currently, you can retire at age 62, even if your full-retirement age falls between 65 and 67. But the full-retirement age is increasing for those people born after 1938. If your full retirement age is older than age 65, you can still retire at age 62. But the reduction in your benefit amount will be greater than for people who reached full retirement age at 65. In addition, if you delay retiring until after your full retirement age, “delayed retirement credits” will boost your monthly benefit amount.

Here’s How it Works

If your full retirement age is 67, the reduction for starting your benefits at age 62 is about 30%; it’s 25% at age 63; 20% at age 64; 13% at age 65; and, 6% at age 66.

As a general rule, early retirement gives you about the same total Social Security benefits over your lifetime but in smaller monthly payments. You have to take into account the number of monthly payments you will receive during your lifetime. Everyone needs to be aware of his or her retirement figures and check to see what benefits, if any, may be available at age 62.

The only other incomes that may affect your Social Security retirement benefits are wages or self-employment income. Everyone should strive to have other sources of retirement income such as investments, individual retirement accounts (IRAs), personal savings and/or 401(k) accounts, none of which have any impact on your Social Security retirement benefits.

The Importance of Disability

Imagine that tomorrow you’re unable — by accident or medical condition — to perform even the simple indoor duties of managing your farm. Few agricultural-related careers offer employees a private long-term disability policy, but nearly all public workers have Social Security disability protection.

Under Social Security, workers are considered disabled if they can’t do the work they did before and their medical condition doesn’t allow them to adjust to other types of work. Such a disability must be expected to last for at least 12 months or to result in death, as Social Security doesn’t pay any short-term disability benefits. Once benefits begin, they continue for as long as the worker is disabled and can’t work.

The average monthly payment to a disabled worker is $1,057. For a disabled worker with a spouse and one or more children, the average payment is $1,585. After receiving disability payments for 2 years, the worker becomes eligible for Medicare.

Survivor Benefits

Survivor benefits are monthly benefits paid continuously to a deceased worker’s family. The value of such survivor benefits for an average wage earner that dies and leaves a spouse and up to two children is equivalent to a $403,000 life insurance policy. The difference is that the Social Security benefits are paid monthly, not in a lump sum.

The average monthly payment for a family consisting of the surviving spouse with two children is $1,747/month. The payments increase based on the annual cost-of-living index, which is something few private insurance plans offer.

Children age 18 or younger, or 19 but still in high school, are eligible for survivor benefits. Eligibility for survivor benefits also applies to a child who is 18 or older but becomes disabled before age 22.

A surviving spouse who is disabled or caring for children under age 16 (or adult children who were disabled before age 22) may receive benefits depending on their income from wages or self-employment. The surviving spouse (age 60 or older, or 50 or older and disabled) also may receive benefits.

Conclusion

While this isn’t an all-inclusive discussion of your Social Security benefits, it should aid you in understanding the benefits your tax money can provide. Depending on your age, past earnings and family composition, Social Security benefits will be a little different for all of us.

For more information, log on to www.socialsecurity.gov or contact your local Social Security office.

* This concludes the two-part series the first of which was published in October 2011.
What are Participants of Breakfast on the Farm Learning?

Ted Ferris, Faith Cullens, Marilyn Thelen, Dean Ross, Nancy Thelen, Mary Dunckel, and Phil Durst

For the third year, Breakfast on the Farm (BOTF) events in Michigan were held last summer. In 2011 MSUE and industry partners hosted eight BOTF events that gave consumers and farm neighbors a first-hand look at modern food production, and the farm families who produce a safe, wholesome food supply for Michigan communities and the world. This is the third article reporting on exit survey results from three of the 2010 events and focuses on what participants felt they knew about eight topics before and after their BOTF visit.

Educational stations used at BOTF provide opportunities for participants to learn about various aspects of dairy farm management. Exit survey participants were asked to indicate what level of knowledge they felt they had on eight topics. They were asked, “For each topic, please indicate how much you feel you knew about the topic BEFORE your visit and how much you feel you know about the topic now AFTER your visit on a 5-point scale, where 1 is ‘Very Little Knowledge’ or ‘Understanding’ and 5 is ‘Very Great Knowledge’”.

There were 573 visitors who responded to this set of questions with an average response of 2.90 for all eight topics before their visit and an average change of 1.47 in responses after their visit (Table 1). Change was determined by subtracting their response for BEFORE from their response for AFTER. This calculation attempts to measure the gain in knowledge they estimate they had at the exit survey.

The 573 respondents felt they had the greatest knowledge about “Milk being a very regulated food” with an average response of 3.38 on a 5-point scale (Table 1). They felt they knew the least (2.55) about “why newborns are removed from their mothers” (a management practice). The change in knowledge was somewhat the inverse to their knowledge before their BOTF visit. This may mean that their self-assessment of what they knew prior to their BOTF visit depended on how much they felt they learned. If they learned a lot, they knew less. For example,

Table 1: Average response about eight topics before BOTF visit and average change in response after BOTF visit for all 573 respondents and for 260 individuals making their first visit to a dairy farm. Averages are from a 5-point scale, where 1 is ‘Very Little Knowledge’ and 5 is ‘Very Great Knowledge’.

<table>
<thead>
<tr>
<th>Topic</th>
<th>All (573)</th>
<th>First visit (260)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Average</td>
</tr>
<tr>
<td></td>
<td>Before</td>
<td>Change</td>
</tr>
<tr>
<td>Milk being a very regulated food</td>
<td>3.38</td>
<td>1.11</td>
</tr>
<tr>
<td>What cows eat</td>
<td>3.25</td>
<td>1.30</td>
</tr>
<tr>
<td>How cows and calves are housed</td>
<td>3.05</td>
<td>1.49</td>
</tr>
<tr>
<td>How cows receive veterinary/health care</td>
<td>2.94</td>
<td>1.33</td>
</tr>
<tr>
<td>Steps taken to ensure that milk from sick cows, that are treated with</td>
<td>2.69</td>
<td>1.62</td>
</tr>
<tr>
<td>antibiotics, is discarded and not sold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amount of milk a cow produces</td>
<td>2.68</td>
<td>1.82</td>
</tr>
<tr>
<td>What farmers do to manage manure to reduce odor, prevent pollution</td>
<td>2.67</td>
<td>1.53</td>
</tr>
<tr>
<td>and use it as a nutrient to grow crops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Why newborn calves are removed from their mothers</td>
<td>2.55</td>
<td>1.53</td>
</tr>
<tr>
<td>Overall average</td>
<td>2.90</td>
<td>1.47</td>
</tr>
</tbody>
</table>
the least change in knowledge was for “Milk being a very regulated food” (1.11). However, the greatest change was in “Amount of milk a cow produces” (1.82), but they felt they knew more about this than two of the topics. This is an objective measurement that is easy to understand and present.

First-time Visitors to a Dairy Farm
Similar to the results for all respondents in Table 1, 260 first-time visitors to a dairy farm felt they knew more about milk being a regulated food and what a cow eats, and least about why newborns are removed from their mothers and what farmers do to manage manure. This group represents 46% of the respondents. Average knowledge before the BOTF visit for the eight topics increased with number of prior visits, ranging from 2.25 for first visit to 4.12 for more than 10 visits. Those who live on a farm would be in the latter group.

First-time visitors gained more than 2 points of knowledge for five of the eight topics (Table 1). And their average gains were 4 times those with more than 10 visits (2.02 vs 0.55). “Steps taken to ensure milk from sick cows treated with antibiotics is discarded” and “Why newborn calves are removed from their mothers” are two important concepts for the public to understand. The former relates to how producers prevent milk from cows treated with antibiotics from being sold. The latter relates to messages that some animal welfare groups push by suggesting that calves should be left with the mother for the calf’s welfare.

Where They Live and Their Connections to a Farm
Demographic information was provided by 545 respondents. Level of knowledge before their visit for those living in urban and rural areas near a farm were similar and greater for all topics compared with those who lived in urban or rural areas but not near a farm. Respondents specified if they lived near a farm or not. The averages for the eight topics for those living in an urban area not near a farm increased 1.67 points from 2.52 to 4.19, a 66% increase. The average increase was even greater for rural residents not near a farm (1.84). The largest increase for the latter group was 2.01 for “How cows and calves are housed” and “Steps taken to ensure milk from sick cows treated with antibiotics is discarded”. The largest increases (over 1.70) for urban residents not living near a farm was for “How cows and calves are housed”, “What farmers do to manage manure”, “Steps taken to ensure milk from sick cows is discarded”, and “Why newborn calves are removed from their mothers”. Responses based upon where they grew up showed similar results to where they currently live.

Average responses for all topics for respondents with parents (3.65) and friends (3.27) who own/owned a farm indicate greater prior knowledge about each topic compared with those who had no relatives who own/owned a farm (2.37). Gains in knowledge were greatest for those who had no relatives who own/owned a farm (1.85) vs. parents (0.93), grandparents (1.36) and friends (1.24) who own/owned a farm.

Why Does BOTF Work?
The BOTF program and similar events build trust through education and transparency. The public receives messages from many sources today and the tendency is to fear what is not understood or to have concerns when messages raise doubts. So education in a transparent format, such as BOTF, provides the public an opportunity to learn first-hand, ask questions, give feedback, and to further develop trust in farmers and the products they produce. Because BOTF involves a high level of commitment and financing we also need to consider the potential impact of these types of events on the image of agriculture.

Conclusion
We might conclude that the more knowledgeable consumers are about food production practices and systems, the more confidence they will have in agricultural products resulting in less support for unnecessary regulations. Unnecessary regulations established to add trust are an expense that both the producer and consumer pay. Breakfast on the Farm may not change attitudes of members of some special interest groups, but it can impact the attitudes of the general public which make up the largest segment of the population.

Further, knowing what the public felt they did or did not understand, prior to their BOTF experience will help us determine where to place future emphasis on educational efforts. For the 2011 BOTF survey, we will look at why individuals attend BOTF, the level of trust they have in various sources of information about our food system, and what they found to be different than they expected.

The BOTF events are a collaborative effort between MSU Extension and local Farm Bureau where the event is presented with significant personnel and financial support from agri-business. The United Dairy Industry of Michigan provided funding for data entry for this survey.
MSU Earns Platinum Reserve Honors at National Dairy Challenge

Miriam Weber Nielsen and Elizabeth Karcher
Dept. of Animal Science

Five Animal Science seniors participated in the 10th annual North American Intercollegiate Dairy Challenge (NAIDC) in Hickory, NC from March 31 to April 2, 2011.

Members of the MSU team earning the 2nd-highest placing of Platinum Reserve were Jillian Holdwick, Animal Science senior, Harbor Beach; Sarah Fraley, Animal Science senior, Sandusky; Melissa Erdman, Animal Science senior, Minden City; and Allan Mergener, Animal Science senior, McMillan. The team was coached by Miriam Weber Nielsen and Elizabeth Karcher, Animal Science. Hannah Tucker (Animal Science senior, Elsie) participated on an aggregate team with students from other universities (Mason Amundson, University of Wisconsin-Madison; and Dallas Carabeau, University of Vermont) and earned a Gold placing. North Carolina State University and Virginia Tech co-hosted this year’s competition, which attracted 127 students from 30 universities from across the United States and Canada.

The first-place platinum awards were given to California State University-Fresno, Cornell University, Penn State University and the University of Wisconsin-River Falls. Other teams achieving reserve platinum awards were from the University of Alberta, the University of Idaho and Washington State University. Each member of the platinum teams received a plaque and a scholarship worth $200 for 1st place or $100 for 2nd place.

The NAIDC consists of four regional intercollegiate dairy management competitions - Midwest, Northeast, Southern and Western - and a national contest. Designed by dairy industry representatives and university faculty members and specialists, the event is supported financially through industry donations and coordinated by a volunteer board of directors. The first NAIDC originated in 2002 at Michigan State University, and since then has helped prepare more than 3,000 students for careers in the dairy industry.

The local MSU Dairy Challenge is held in the fall and all undergraduate and veterinary students with interest in dairy production and management are encouraged to participate. The event is designed to be similar to the national contest. From participants in the Novice Division of the MSU Dairy Challenge, 4 students are selected to represent MSU in the Midwest Regional Dairy Challenge. The competition offers an environment that tests the students’ knowledge of the dairy industry in a fun and educational setting. One of the most important aspects of the Challenge is enhancing students’ ability to work as a member of a team.

Day one of the two-day competition began with each team receiving a packet of information on the dairy they will visit that day. Each packet included production and farm management data. After a visit to the dairy and an interview with farm personnel, team members work together to develop a comprehensive program to include recommendations for herd management. Students were challenged to not only identify potential areas of improvement, but also to prioritize these areas. On day two, teams present their recommendations to a panel of judges. Students field questions from each of the judges. The evening concludes with a banquet and presentation of awards.

Eighty-two students participated in the MSU Dairy Challenge in the fall of 2010. The advanced division consisted of 8 teams, the novice division had 6 teams, the Ag Tech Dairy Management division had 4 teams, and the Veterinary Student division had 2 teams. Students in the advanced division must have completed courses in dairy nutrition or advanced dairy management. The contest farm was owned by Ken and Larry Nobis of St. Johns.

The winning team in the advanced division received $160 and consisted of Jordan Boniface (Animal Science senior, Delton); Jeff Shepherd (Animal Science senior, Saginaw); Lauren Stanko (Animal Science senior, Holly); and Anthony Vanderploeg (Agribusiness Management senior, Ithaca). The second-place team received $80 and was comprised of Krista Beeker (Animal Science/Agricultural Communications senior, Constantine), Katie Marcath (Animal Science senior, Macomb), Elizabeth Motz (Animal Science/Agribusiness Management senior, St. Johns), and Caroline Rauschendorfer (Animal Science senior, Macomb). The team placing third and receiving $60 was Allan
Mergener (Animal Science senior, McMillan), Tracy Hillier (Animal Science senior, Marquette), Jessica Makowski (Animal Science senior, Macomb) and Sarah Fraley (Animal Science senior, Sandusky).

The winning team in the novice division received $160 and consisted of Lauren Bush (Animal Science sophomore, Swartz Creek), Tera Koebel (Agribusiness Management sophomore, Three Oaks), Eric Sneller (Animal Science junior, Sebewaing), and Jenna Taylor (Animal Science senior, Stockbridge). The second place team received $80 and comprised of Jacob Gillis (Animal Science freshman, Dexter), Kristi Kocsis (Animal Science junior, Lansing), and Arianna Walters (Animal Science junior, Pinconning).

The first place team in the Ag Tech Dairy Management (second year) Division received $160 and included Laura Nesbit (Frankenmuth), Todd Snyder (Twining), Brandon Delong (Grant) and Casey Klein (Animal Science senior, Richland). The second place team earned $60 and consisted of Dale Dick (McBain), John Anibal (Gaines) and Ross Williams (Homer).

Two teams participated in the Veterinary Student Division and placed in a tie: Henry Reinart (1st year, Hopkins), Christine Kostesich (1st year, Washington), Jacquelyn Rowley (1st year, Richmond) and Kayla Stomack (1st year, Minden City); and, Christine Hadley (2nd year, Hartford), Lee Anne Peasley (2nd year, Alpena), Chelsea Render (2nd year, Manchester) and Jamie Strickland (2nd year, East Lansing). Each team received $80.

Jenna Taylor, Eric Sneller, Kristi Kocsis and Jared Scheurer (Ag Tech Dairy Management, Ionia) represented MSU at the 7th annual Midwest Regional Dairy Challenge. The design of the Midwest Regional is unique in that students were placed on 5-person teams with students from other colleges and universities. Their teams placed Silver, Platinum, Platinum Reserve and Gold, respectively. The event was held February 3 to 5, 2011 in Menomonie, WI and included 68 students from 16 universities and colleges across the Midwest.

Sponsors for the MSU Dairy Challenge include ABS Global, ADM Alliance Nutrition, Caledonia Farmers Elevator, Cargill Animal Nutrition, Deckerville Veterinary Clinic, Diamond V, Falmouth Cooperative Company Inc., Kalmbach Feeds Inc., Land O’ Lakes Purina Feed, Michigan Milk Producers Association, Nobis Agri Service Inc., NorthStar Cooperative and AntelBio, Prince Agri Products Inc., and Vita Plus Corporation. Dr. Roger Mellenberger, the Roger and Marjorie Mellenberger Dairy Associates Program Enhancement Fund; and, the Frederick P. Halbert Memorial Endowed Scholarship Fund provided additional monetary support.

Acknowledgements and thanks are extended to the Nobis Dairy Farm and Dr. Kevin Dill and Bob Krieger with Land O Lakes Purina Feed for working with Ken and Larry Nobis to host the MSU Dairy Challenge. The contributions of the MSU Dairy Challenge judges are greatly appreciated: Dr. Herb Bucholtz, MSU Animal Science; Dr. Bruce Clark, NorthStar Cooperative Inc.; Dr. Kevin Dill, Land O’ Lakes/Purina Feed; Phil Durst, MSU Extension Dairy Team member; Tom Herremans, Michigan Milk Producers Association; Dr. Jerry Kehr, Countyline Veterinary Clinic; Gabe Papoi, ABS Global; Dr. Aaron Park, Kalmbach Feeds Inc.; Dr. Richard Pursley, MSU Animal Science; Dr. Gerald Segerlind, Countyline Veterinary Service; Brian Troyer, Caledonia Farmers Elevator; and Matt Wood, Vita Plus. Special thanks also go to Brad Curtis; Marcus Hollmann, Sarah Stocks, and Kim Kammes, MSU Animal Science; Dean Ross, MSU Extension Dairy Educator; and Doug Brook, NorthStar Cooperative for help in coordinating the MSU Dairy Challenge.

The support from all of the Dairy Challenge sponsors makes the MSU, regional, and national Dairy Challenge events possible. Additional information on the regional and national Dairy Challenge events and a listing of corporate sponsors is available at: http://www.dairychallenge.org.

For more inquiries about the MSU Dairy Challenge, contact Weber Nielsen at msw@msu.edu or 517-432-5443.

Continued from Page 11.

Diagnostic Testing...

What to Do with PIs

First and foremost, the animal needs to be eliminated from contact with other cattle. Three options are: 1) humanely euthanize, 2) sell to a slaughter only market, or 3) isolate and raise for slaughter. NOTE: There is no evidence that BVDV is a zoonotic disease (transferrable to humans). The option obviously depends on the age and size of the animals. Most importantly, do not create a situation where a PI may serve as a reservoir of virus transmission to another farm. It is unethical to sell animals you suspect as being PI’s at an auction where the animals may be retained in a breeding herd (e.g., don’t take it to your local livestock market).

Concluded on Page 21.
Table 2: Summary of BVDV diagnostic tests and their uses.

<table>
<thead>
<tr>
<th>Diagnostic Test</th>
<th>Relative Cost</th>
<th>Specimen</th>
<th>Used For</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polymerase chain reaction (PCR)</td>
<td>Moderate to High</td>
<td>Serum, Whole Blood, Tissue</td>
<td>Identifying PI’s and acute infections</td>
<td>Rapid and sensitive.</td>
</tr>
<tr>
<td>Pooled - Polymerase chain reaction (PCR)</td>
<td>Low</td>
<td>Skin – usually taken from ear</td>
<td>Identifying PI’s</td>
<td>Skin samples can be pooled to reduce costs. Number per pool depends on laboratory</td>
</tr>
<tr>
<td>Immunohistochemistry (IHC) of skin</td>
<td>Low</td>
<td>Skin – usually taken from ear</td>
<td>Identifying PI’s</td>
<td>Fresh or formalin fixed samples. Work closely with your laboratory to provide their preferred sample</td>
</tr>
<tr>
<td>Antigen-capture ELISA - ACE</td>
<td>Low</td>
<td>Serum or skin</td>
<td>Identifying PI’s</td>
<td>Rapid results. Serum testing may be inhibited by passive immunity; not recommended for young calves &lt; 4 mo</td>
</tr>
<tr>
<td>Rapid Immunomigration Assay</td>
<td>Moderate</td>
<td>Serum or skin</td>
<td>Identifying PI’s</td>
<td>Animal side assay (IDEXX BVD TEST), rapid results.</td>
</tr>
<tr>
<td>Virus Isolation</td>
<td>Moderate to High</td>
<td>Serum, Whole Blood, Tissue samples – spleen, lung, small intestine, thymus</td>
<td>Identifying Acute or PI infections</td>
<td>Gold standard test for detecting BVDV, however expensive, takes a long time to conduct and requires specialized labs</td>
</tr>
<tr>
<td>Virus Neutralization or Antibody ELISA on individual animals</td>
<td>Low</td>
<td>Serum</td>
<td>Identification of virus exposure - NOT useful for detecting PI’s</td>
<td>Detects immune response (titer) to BVDV</td>
</tr>
<tr>
<td>Bulk tank PCR</td>
<td>Low</td>
<td>Milk</td>
<td>Herd screening</td>
<td>Can detect 1 PI in 300 cows. Looks only at lactating cows</td>
</tr>
<tr>
<td>Sentinel serology</td>
<td>Low</td>
<td>Serum</td>
<td>Herd Screening</td>
<td>Conducted on unvaccinated young stock between ages of 6-12 months of age</td>
</tr>
</tbody>
</table>

**Summary**
Research has led to the development of a variety of tools that are useful in the control of BVDV. These tools include multiple different diagnostic tests, vaccines and biosecurity tools. Diagnostic tools can be used to answer a variety of questions related to BVDV. Selecting the correct diagnostic tools requires an understanding of how BVDV works. BVDV diagnostic strategies should not be a standalone BVDV control program, rather they should be incorporated with a well designed BVDV vaccine program and the implementation of strategic biosecurity protocols.

Author’s Note: This summary is abstracted from a presentation given at the 5th US Symposium, November 17-18, 2011, San Diego, CA. 

**Continued from Page 5.**

**Right to Farm...**
review. It should be noted that owners of projects not requiring MDARD verification are still expected to collect all the required information and self-determine if the site meets GAAMP standards. Owners of these sites may request MDARD verification for their own peace of mind.

**Proceeding with Verification**
The approval or verification process begins with a livestock producer submitting a Verification Request to MDARD. If the farm owner requests MDARD siting assistance, then MDARD staff will visit the site prior to any steps being taken, as a preliminary site evaluation. MSU Extension Educators may also be invited to the early site visits. Often times these early visits can determine if the site has potential and if there are any extenuating circumstances the owner will need to consider during the application process. The site verification request requires the farm to provide the following items:

- Detailed site plan.
- Manure Management System Plan. A key aspect of the Manure Management System Plan (MMSP) is to show that the expanded or new operation will have adequate land base for manure that will be produced.
- Construction drawings and specifications for the manure storage structure.
- The results of a subsurface soils investigation when the project includes a manure storage structure.
- A topography map and a soil map.
- Proposed Category 1 sites which do not meet all property line setbacks or will house more than 1,000 cows.

View the online version of MDR (including archived issues) at: www.msu.edu/user/mdr/.
Continued from Page 4.

Intensified Feeding Programs...

men development and increased milk consumption reduces intake of starter. Careful attention to gradual weaning and maintenance of starter intake is essential to realize advantages of intensified feeding programs. One way to do this is to feed milk or milk replacer only once per day for several days to encourage greater intake of starter. Feces may be looser with calves on intensified programs, requiring greater attention to correctly identify sick and scouring calves. Additionally, more bedding may be required to maintain a clean, dry environment for the calf.

Costs and Returns

Intensified feeding programs cost about $35 to $55 more per calf in milk replacer and starter than traditional programs. Calves will grow faster and attain breeding size earlier, and may even produce slightly more milk. Results from our most recent study indicated that while feed costs were $1.27 greater/calf per day than the traditional program, the decrease in age at first calving and a trend toward greater milk yield in first lactation resulted in no difference in total returns. If the sale price of milk is high, the return will likely be positive. In fact, our results support the idea that the economic advantage of accelerated growth programs could be almost 3 times the initial extra cost of milk replacer, and likely would not be negative. This suggests that the decision about whether or not to use accelerated programs should be based on other farm-specific factors.

Summary

Intensified feeding programs can produce larger calves at weaning and heifers that reach breeding size at a younger age. Calves may have looser stools during the pre-weaning period although health status is not affected. First-lactation milk yield tends to be higher for cows on intensified feeding programs as calves. Economically, intensified and traditional feeding programs were not significantly different in cost, indicating producers can consider other farm-specific factors in selecting a feeding program for their calves.

Continued from Page 21.

Right to Farm...

animal units; and all Category 2 sites must submit an Odor Management Plan including the results of the Michigan OFFSET Model for the site.

Based on the dimensions of the animal housing and manure storage facility MI OFFSET results provide an odor footprint for the site estimating the number of non-farm residents who will notice recognizable odors 5, 3, and 1.5 percent of the time. On a case-by-case basis, MDARD may adjust property line setbacks based on the results of the Odor Management Plan.

The OFFSET model helps producers determine the appropriate location of the facility in order to minimize the impact of the livestock facility on near-by residents. It also allows producers to see the beneficial effects of various methods of odor mitigation technology such as bio-filters or manure storage covers including natural crusts, straw and synthetic covers.

In addition, all new manure storage structures need to be built using USDA Natural Resources Conservation Service (NRCS) or Mid-West Plan Service (MWPS) construction standards. Designs approved and stamped by a professional engineer (PE), to indicate that the manure storage facility meets these standards, must be submitted to MDARD with the site verification request. To ensure the integrity of the project, the PE must monitor the construction of the manure storage structure and provide the owner as-built documentation. The facility meets the design standards indicated in the drawings. The MDARD will review the as-built documentation during the agency’s post-construction visit. The MDARD will conduct a pre-construction inspection and review the Verification Request with the producer to determine if all of the requirements were met. A pre-population inspection will be scheduled once the facility has been constructed.

Summary

Siting GAAMPs provide a planning process that can be used to properly plan new and expanding facilities, increase the suitability of a particular site and enhance neighbor relations. They help ensure high environmental and social standards so that the Michigan livestock industry can continue to grow. For additional information, feel free to contact Roberta Osborne (rosborne@msu.edu) or Steve Mahoney (mahoneys@michigan.gov).

To learn more about Site Selection GAAMP and to download an application form, go to: http://www.michigan.gov/documents/mda/2011_DRAFT_SITE_SELECTION_GAAMPS_339407_7.pdf.
MSU 2012 Winter Dairy Program

“Making Labor the Most Productive Enterprise on the Farm”

The program will challenge participants to think about their relationships on the farm with employees and family members. It will prepare them to take their dairy operation to a new level of teamwork and business results.

**Dates and Locations:**

- **February 20-21, 2012**
  Amway Grand Plaza Hotel, Grand Rapids, Michigan
  Monday Evening Session: 6:30 - 8:30 p.m.
  Tuesday Session: 9 a.m. - 4 p.m.

- **February 22, 2012**
  Great Wolf Lodge, Traverse City, Michigan
  Day Session: 9 a.m. - 4 p.m.
  Evening Session: 6:30 - 8:30 p.m.

- **February 23-24, 2012**
  Bavarian Inn and Conference Center, Frankenmuth, Michigan
  Thursday Evening Session: 6:30 - 8:30 p.m.
  Friday Session: 9 a.m. - 4 p.m.

**Keynote Speaker:**
Robert Milligan, Sr. Consultant, Dairy Strategies, Inc.
Professor Emeritus, Cornell University.

**Other Featured Speakers:**
- Charles P. Contreras, PeopleFirst, Human Capital Services of Pfizer Animal Health
- Ron Erskine, Michigan State University
- Richard Pursley, Michigan State University
- Herb Bucholtz, Professor Emeritus, Michigan State University
- Stan Moore, MSU Extension Dairy Educator
- Phil Durst, MSU Extension Dairy Educator

**Registration Pricing**
$125 per person, $210 per management team (two people from same farm).

**Topics Featured:**

- **Farm business success in turbulent times**
  Learn what dairy managers must become to succeed today and into the future as family farm owners.

- **Employee involvement in the business**
  Hear how two progressive producers have involved employees in their business.

- **Quality control through employees**
  Develop the practical aspects of consistency and quality in herd management.

- **Labor management on the expanding enterprise**
  As a farm expands, it is important for the managers to grow and change the leadership, supervision and coaching of employees for success.

- **Supervisory skills for exceptional employee performance**
  Learn effective tools for supervising and leading your workforce from cutting-edge research, participant activities and examples.

**Special Evening Session:**
In addition to the daylong training the program will feature an evening session to foster discussion about family teamwork in management.

**To register:**
Go to http://bit.ly/dairylabormgt or contact ANR Event Management via email: honkemeg@msu.edu.
Or call (517)-353-3175, ext. 229.

For more information contact: Phil Durst, 989-387-5346, Email: durstp@msu.edu; Stan Moore 231-533-8818, Email: moorest@msu.edu.
The Michigan Dairy Review is published in January, April, July and October by the Dairy Programs Group at Michigan State University. It provides useful information to the dairy producers and dairy-allied industries of Michigan to enhance the success of their businesses. The MDR is located online at <https://www.msu.edu/user/mdr/>.

Permission to translate and reprint from MDR 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 or changed please send facsimile (517-432-0147) of the new version to the Publisher for verification and approval. 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.

Michigan State University is an affirmative-action, equal-opportunity employer. Michigan State University Extension programs and materials are open to all without regard to race, color, national origin, gender, gender identity, religion, age, height, weight, disability, political beliefs, sexual orientation, marital status, family status or veteran status.