IOWA STATE UNIVERSITY
Extension and Outreach

DAIRY News & Views from the ISU Extension Dairy TEAM

Volume 32 www.extension.iastate.edu/dairyteam July, 2012

Larry Tranel

Jenn Bentley

Reducing Risk Management of Milking

ISU Extension and Outreach Dairy Team has received a Risk Management Grant to study and teach dairy producers in Iowa the economic and production impacts of Low Cost Milking Parlors and Automatic Milking Systems.

The goal is to help producers make well researched decisions when they determine what future milking system might best fit their farm's labor and financial situation.

So, check out the flyer inside where we will tour many Low Cost Parlors and Automatic Milking Systems around the state to present the survey data and also discuss the pros and cons of these types of milking systems.

Also, we would like to welcome two new colleagues on our dairy team:

Kevin Lager will join us as a dairy field specialist in NW Iowa beginning September 1st.

Dan Huyser joined our dairy team May 21st as our dairy ag engineer. Please see their introduction articles inside the newsletter.

We are experiencing the worst milk--feed price ratio in recorded history. Please let us know if we can help weather the storm we may be experiencing by the end of the year as these high feed prices continue.

Kevin Lager (beginning duties September 1st)
ISU Extension Dairy Field Specialist, NW Iowa

Jenn Bentley and Larry Tranel
ISU Extension Dairy Field Specialists, NE and SE Iowa

Edited by: Larry Tranel

ISU Extension Dairy Team
"Bringing Profits to Life"

Transitioning Out of a Stall Barn? Thinking about Building a Milking Parlor or Putting in an AMS (Robot)?

There are so many variables to making the transition from a stall barn to a more labor efficient milking, feeding and manure handling system. How does a producer determine whether to put in a milking parlor or AMS? A lot depends on the system you are currently in versus the system you are moving to.

For example, say a producer is currently milking in a stanchion or tie stall barn and wanting to change. The payback on moving from milking in the stall barn versus a parlor, using a low-cost TRANS Iowa design, for instance, might only cost $0.87 per cwt of milk sold annually (including labor and capital) to install this parlor. The low cost parlor has the potential to payback in a year or less.

The biggest success seen with producers over the years has been making the transition from the stall barn to a low cost or moderate cost milking parlor. This undoubtedly is the first step to having a more labor efficient and more profitable operation as often twice the number of cows can be milked with the same or even less labor. The lack of an efficient milking system tends to be one of the biggest bottlenecks (holdups) on most dairy farms that limits potential profits.

The stall barn, which is probably costing in the area of $1.62/cwt just for labor (not giving any value to the capital cost) is a more expensive way to milk cows than a low cost parlor but comparable to a moderate cost parlor. The AMS will cost $1.97 to $2.83/cwt sold annually to milk the cows and somewhat comparable to brand new, higher cost parlors. Keep in mind, each of the systems have lots of variability that impact profit.

ISU Extension has a spreadsheet decision-making aid that can assist producers determine both cash flow and financial impacts of AMS. In addition, we have good data from producers who have switched from stall barns to low cost parlors that can assist producers as well. Simply give us a call to do a free facility assessment for your dairy.

Inside This Issue:

Dairy Field Specialists

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Valuing Corn Silage

Kristen Schulte, ISU Extension Agri-Business and Farm Management Specialist, NE Iowa

Total feed cost consists of forty to sixty percent of total variable costs on a dairy operation. Measures like feed cost per cow or hundredweight milk produced and income over feed costs are important financial measures to calculate and track over time. While producers have a good handle on the cost of purchased commodities, typically, raised feedstuffs are harder for producers to place a value on when measuring feed cost. In particular, corn silage dollar valuation per ton brings forward questions due to lack of volume sold on the open market.

There are five common ways corn silage can be valued on a per ton basis. They are cost of production, nutrient valuation, market value, corn market and nutrient valuation, corn price multiplier. Each of these valuation methods are outlined below on how to calculate the associated value of corn silage per ton.

1. **Cost of Production** is the total cost of inputs to produce corn silage. Total seed, fertilizer, insecticide, herbicide, crop insurance, land cost, property taxes, machinery, and labor should be included in this value. Fertilizer should include value of manure based on nutrient value if applied. Land cost can be equivalent to current cash rental rates. Machinery cost should include associated depreciation, interest, insurance, housing, fuel, oil, and repair costs; these can be calculated for equipment based on actual costs or custom rates can be used.

   Labor should include all hours for fieldwork, scouting, and storage. Accurate records for input costs are needed to fairly calculate cost of production per ton of corn silage. Crop costs of production budgets are available through ISU Extension that can be used to help calculate cost of production per ton.

2. **Nutrient Valuation** of corn silage is typically calculated by a nutritionist through a software program to base the feedstuff value on comparative nutrient values. Some nutrients typically used are net energy lactation, metabolizable protein, effective NDF, and non-effective NDF. Visit with your nutritionist to calculate a nutrient based corn silage value.

3. **Market Value** is the value of corn silage in the local market. Typically, producers do not sell corn silage due to farm silage production corresponding to on-farm needs. However, if a local market is present, market sale prices plus transportation costs can be used.

4. **Market and Nutrient Valuation** takes the market value of the corn, converts it to a corn silage value, then adjusts it for the nutrient value of the harvested silage. For explanation purposes, it is assumed that a ton of corn silage is half grain and half stover in weight and is harvested at 35 percent dry matter. This will equal to 350 pounds or 7.4 bushels of corn per acre. The bushels per acre multiplied by a current local corn grain price, this results in the market value of corn silage per ton. No two farms corn silage are the same due to field, growing, harvest, and storage conditions; therefore, a valuation to differentiate based on product differences is needed.

   Jim Linn, University of Minnesota Extension Dairy Nutritionist, recommends the market value, previously calculated adjusted by starch and NDFd nutrient levels to value corn silage. In vitro research has shown that every percent of NDFd is worth 0.6 pounds of milk. The NDFd adjustment is the NDFd percent multiplied by 0.6 pounds milk and dollars per pound received for shipped milk. The starch content is a measure of the amount of corn grain in the silage. The average starch content is 29 percent; the corn silage value is then adjusted for difference in starch above or below this average. The adjustment is the difference of starch multiplied by 50 percent ratio of corn to forage and by the price per bushel of corn. These three values, corn market equivalent and NDFd and startch adjustments, are added together to result in a total value per ton of corn silage.

5. **Corn Price Multiplier** is a short cut method to convert corn price per bushel to forage price per ton based on commodity grain markets. This value is based on the assumption that the corn and stover could be removed and sold instead of harvested for corn silage. The result should equal the value of corn and stover removed from the field. Based on the above calculations, one ton of corn silage harvested at 35 percent dry matter is equivalent to 7.4 bushels of corn. For the corn market value, we have a base multiplier of 7.4. With the addition of stover nutrient value removed and cost of transporting and storage of corn silage, the multiplier moves up to 10, based on studies completed by Brian Anderson, University of Nebraska Extension Forage Specialist. A multiplier of 10 times the price per bushel of corn is commonly used to calculate corn silage per ton.

How should a producer value their raised corn silage? Each formula for calculation offers its benefits and drawbacks; however, a producer should select one method they are comfortable with and use it consistently over time for comparative analysis of feed and IOFC measures.

Welcome to Dan Huyser

I'm Dan Huyser, the new Agricultural engineer for Northeast Iowa with Iowa State University Extension and Outreach. I grew up in the small town of Badger Iowa, which is located just north of Fort Dodge.

While my grandparents all farmed and had livestock, I didn't get involved with it until I started working for the Land O Lakes Answer Farm in the Dairy Unit while in junior college. I spent the next ten years there learning about all aspects of dairy management including milking, feeding, herd health and reproduction, as well as about many types of equipment and facilities.

While at the Answer Farm, I completed a degree in Animal Science from Iowa State University.
After Land O Lakes, I worked as a herdsman on a 100 cow Holstein dairy for a year and a half. High points in my time there include improving milk quality substantially and encouraging changes to the feeding system that reduced the incidences of displaced abomasums considerably.

Returning to Iowa State to study Ag Engineering, I found myself working on a Guernsey farm by Ames as a part time job. When the Guernsey herd was sold, I raised heifers for another producer in the facilities. Graduating from ISU in Ag Engineering, I went to work as a design engineer for a company that built equipment and facilities for corn plants. I developed conveyors, grain receiving and drying equipment, and worked with structures.

For a while I then worked with property management, but I found that I missed being involved with the livestock industry. I'm now happy to have become a part of Iowa State University Extension and Outreach. The main areas I will be working with are manure and manure handling, ventilation systems, livestock structures and facilities, and water quality.

I enjoy spending time with my wife and son. My other interests include Boy Scouts, gardening, woodworking, and antique tractors. So far, I have been enjoying meeting people and am looking forward to the people and subjects I have as yet to encounter.

Dairy producers can contact me via:

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Kevin Lager to Join ISUEO Dairy Team

We're extremely excited and honored to have Kevin Lager join the ISU Extension and Outreach Dairy Team as a dairy specialist in NW / W Iowa starting September, 2012. Kevin hails from a small dairy in NW Kansas. Kevin received his BS in agriculture and agricultural economics and MS in dairy nutrition from Kansas State University. He also assisted in teaching three undergraduate courses, managed the KSU Dairy in the manager's absence, and interned on a large dairy in SW Kansas.

Since May 2009, Kevin has been working on his PhD in dairy nutrition and physiology while also working as an extension associate with the Texas Extension Service. His research has focused on metabolic profiling in transition cows where he worked extensively in the field with 20 herds. Kevin has been extensively involved in dairy extension education and programming through many articles and presentations. He has developed fact sheets/modules and conducted dairy worker trainings.

Kevin conducted the dairy survey of the Texas Panhandle and provides nutrition and management support and education to dairy farmers and the industry. He has also worked extensively with individual dairies and producers as well as dairy youth programs. Kevin will move his wagon to NW IA in September accompanied by his wife, Melanie, and three young boys (ages 4, 2, and 9 months). Please help us welcome Kevin and his family as they will be a great asset to our state and the Iowa dairy industry.

Coming This Fall….A New Dairy Management Package

This fall as harvest winds down and dairy producers have a little more time, we will be introducing a new management assistance program to improve dairy profitability. This is a key element in the Dairy Iowa movement to grow and strengthen the Iowa dairy industry.

Using Water to Help Cows with Heat

by Dan Huyser, ISU Extension Ag Engineer, NE Iowa

With the hottest months of summer on the way, it is time to be considering ways to help your herd to cope with the added stress from the heat. Water is one of the most important tools we have to help keep animals cool and comfortable and minimize the "summer slumps" in milk production and reproductive performance.

Plenty of cool, clean water is vital during high heat. Water helps remove heat in several ways. The water a cow drinks will cool her insides as it is ingested. Heat is also removed with the moisture in her breathe, in her urine and feces, and as she sweats. A dairy cow consumes up to 50% of her daily water intake within an hour after milking, so providing fresh, clean water at the parlor exit is an excellent way to encourage water consumption.

Adding a water tank to a pen to allow easier access to water for all cows is another option in free stall barns. Shades over outdoor waterers will help to keep water cool and algae- free for penned stock and dry cows as well as those being pastured.

Evaporating water can provide extra cooling benefits. Sprinkler systems used in conjunction with fairly high velocity air will provide an effective means of heat relief. The idea is to soak the cow to her skin and turn the water off for a long enough period to allow the moving air to "dry" her. While drying, heat is removed from the skin during the evaporation process cooling the cow. When people climb out of a swimming pool and experience a chill until their skin dries, they are experiencing the same process.

There are several things to be considered before turning on the water. First, where are good areas to do this? Holding pens and feeding areas are the most common spots. Parlor return alleys can also be equipped with sprinklers to soak cows going back to areas where spraying water isn't possible, such as tie stall barns and maternity pens, giving them brief relief from the heat.

Second, are water supplies available to be wetting cows? Typically, a system is set up using sprinkler nozzles and piping sized to provide 0.5 gallons/minute of water. The recommended cycle is 2-3 minutes on and 15-20 minutes off to allow drying. This adds up to around 30 gallons per day per nozzle if run 24 hours. Spacing nozzles 10 feet apart in a 100 foot long barn with 2 alleys would require 600 gallons of water in a day.

Third, is there enough storage space in the manure system to handle the extra volume of water? Storage fills up fast with extra water and over flowing pits or lagoons a definite problem. Fourth, is there enough air velocity to cause quick evaporation? If cattle are crowding in stagnant air, adding more water to the environment will only increase the humidity and cause even more stress. Open sided barns may require additional circulation fans on still days to maintain enough air velocity to evaporate water. Barns with tunnel ventilation will generally have enough air velocity.

A fifth area to consider is nozzle placement. Care must be taken to place nozzles so that water isn't getting into feed areas or stall areas. Circulation fans and breezes coming through the sidewalls can necessitate changing the position on water nozzles to direct water away from these areas. And lastly, a producer needs to be aware that added water in the alleys can increase foot health issues as well as increase the potential for mastitis.

While not a substitute for cool weather, making sure cattle have plenty of fresh, clean water to drink and using a water sprinkler system to help cool hot cows can make a difference.

Management Tools Website

Producers or consultants who want to view a collection of state-of-the-art dairy management tools that are: user-friendly, interactive, robust, visually attractive, and self contained, please go to the following website by Dr. Victor Cabrera, UW-Extension:
http://dairymgt.uwex.edu/tools.php

All these tools have clear or self-explanatory instructions and technical support available. Some of the tools include:

FeedVal – 2012; Grouping Strategies for Feeding Lactating Dairy Cattle; Income Over Feed Supplement Cost; Dairy Extension Feed Cost Evaluator; Corn Feeding Strategies; Income Over Feed Cost;
Dairy Ration Feed Additive Break-Even Analysis; Cost-Benefit of Accelerated Liquid Feeding Program for Dairy Calves;

Economic Value of Sexed Semen Programs for Heifers; Heifer Replacement; Heifer Break-Even; UW-DairyRepro$Plus; Exploring Timing of Pregnancy Impact on Income Over Feed Cost; Dairy Reproductive Economic Analysis; Decision Support System Program for Dairy Production and Expansion;

Economic Analysis of Switching from 2X to 3X Milking; and many, many more.

Please give it a look!

The Economics of Automatic Milking Systems

Introduction
Installation of Automatic Milking Systems (AMS) in Iowa is expected to more than triple in 2012. It is probable that by 2020, 10% to 30 % of dairy producers will be using AMS in their dairy operations. In order to assist dairy producers and their lenders make informed decisions on the economic variables associated with AMS consideration, these authors developed a partial budget spreadsheet tool. See Page three for assumptions and calculations.

There are two very important things to note when comparing AMS versus conventional parlor milking. First, many factors are "highly variable" meaning that slight changes in milk price or projected change in milk production, for instance, can significantly change the financial impact. Second, there is limited data to base various assumptions meaning producers and consultants will have limited research data for projecting costs and incomes with high confidence levels.

Herd and Financial Assumptions
Herd size is important in calculating the number of AMS needed. One AMS can handle an estimate 55-65 <u>milking</u> cows. An additional 10% to 12% herd size can be added when including dry cows. Thus, a 70 cow total herd per AMS can be feasible depending upon milk production.

Milk price should be estimated as a long term, projected average. Estimated cost per AMS should include new building or modifications to existing structures to house the robot and adequate alleys for cow flow. An estimation of $10,000 per AMS for housing can be expected and most robots coming on the market in 2011 are estimated to cost around $200,000 per AMS.

Many AMS installed in 2000 are still in operation. So, "years of useful life" is an unknown variable. Seven years of useful life is a very conservative estimate while more than 12 years may be risky, especially with the rapid development in AMS technology. The value of AMS after its useful life is also not clearly defined at this time.

Interest rate on money should display the rate which represents cost of interest paid or the opportunity cost of the owner's money, or, a combination of both. Insurance rate is the rate per $1,000 of value of AMS. Value of AMS used for interest and insurance is the full investment value less salvage value.

Bottom Line of AMS: Cows and People Like Them!

Labor Changes
One of the leading interest factors of AMS is the reduction of labor. Current hours of milking for the designated herd size in a conventional parlor needs to be compared to the anticipated hours of milking labor after the AMS is installed. Typically, the training period will last three months, labor rates after this period should be used in the assumptions. A reduction in time managing labor is probable.

The herd management software includes rumination, milk conductivity and cow activity. This information can lead to labor savings from heightened heat and mastitis detection and faster identification of sick cows. There will likely be an increase in records management with the AMS to utilize the software data that might not be there with conventional milking systems.

Milk Production and Quality Changes
Producers <u>may</u> experience losses in milk production six to nine % lower from 3x milking. From 2x milking, one could expect a three to five % increase or more. This is a huge variable of AMS financial impact. Somatic Cell Counts (SCC) and bacteria counts tend to increase in the first few months after adoption to the AMS but tends to drop to initial levels or even lower after the adoption period.

Feed Costs and Intake Changes
Feed cost per pound and intake level changes are seldom accounted for but can be significant. Milk production and feed intake have a positive correlation. AMS utilize a pelleted feed during milking which may increase feed cost depending on cost and current TMR. However, feed cost could decrease relative to previous feeding practices as cows are individually fed with AMS.

Culling and Herd Replacement Changes
Most producers report no change in culling percent. But, expected change in turnover rate should be accounted for in herds with poor feet and legs or possibly herds with genetic potential for lots of reverse tilt udders.

Utilities and Supply Changes for Milking
AMS systems may increase electrical usage up to 150 kWh per cow per year. Water usage may decrease 50 % or more for small herds using only one AMS, but water usage is more comparable for herds using two or three AMS. Chemical and supply costs may be higher in some instances but in most instances would slightly decrease.

Kristen Schulte, Farm and Agri-Business Management Specialist and Larry Tranel, Dairy Field Specialist, ISU Extension Dairy Team

Sample 140 Cow Dairy Converting to AMS

A 140 cow herd and $17 per cwt milk price are used as a basis for installing two AMS at a cost of $210,000 per unit. A $10,600 annual maintenance agreement is also purchased. The producer expects a ten year useful life out of the AMS at which time he plans to retire and estimates the robots can be resold for $40,000 each. Using a combination of borrowed and own money, the interest cost is 5.5 %. And, the producer further insures the AMS at a value of $350,000 higher than the current system at a rate of $0.005 per $1,000 of valuation.

The producer is currently using 6.5 hours of labor for milking including set-up and clean-up and expects the time for fetching cows and clean-up of the AMS area will be 1.5 hours per day. Heat detection is projected to decrease from 30 to 0 minutes per day. The labor rate for the milking and heat detection is currently hired at $15 per hour, including benefits and employment taxes.

The producer recognizes that there will be an additional 15 minutes per day of records management with the AMS but also estimates there will be a reduction of a half hour per day in management of labor. The labor rate for record and labor management is valued at $20 per hour.

The herd has a current bulk tank average of 70 pounds per cow on 2x milking. A seven pound per cow (10%) increase in milk production is projected. The producer also expects the AMS to do a better job with pre and post milking sanitation, thus reducing his SCC by five %.

The Total Mixed Ration (TMR) fed to the herd currently costs $0.105 per pound of dry matter. The daily dry matter intake per cow will increase with the additional seven pounds of milk. Even though now using a pelleted feed in the AMS, a very small decrease of $0.001, one-tenth of one cent, is estimated as the change in cost per pound of dry matter due to individual cow feeding.

The producer expects a one % decrease in herd turnover rate. Replacement heifers are valued at $1,600 and cull cows sold for milk or dairy at an average of $850.

An increase of $8.25 per cow per year for electricity is anticipated with AMS. Due to neighbor's experiences, this producer estimated a $3 savings per cow for water use and a $1.50 increase in chemical or other supply use.

Partial Budget Analysis for 140 Cow Dairy

A partial budget considers changes to an operation due to AMS adoption including increased or decreased incomes or expenses. All costs are on an annual basis. At $17.00 per cwt milk price for 140 cows, an additional $54,978 of milk production income is generated. Reducing SCC by five % with a $0.003 per 1,000 ml change yielded $1,281 in premiums. A one % decrease in cow sales equaled -$1,190 in cull cow sales. Total increased incomes equaled $55,069.

Decreased expenses that also created a positive impact include labor savings of 0.5 hours of heat detection, 4 hours of milking and 0.5 hour of labor management per day. This equates to financial savings of $2,738 in heat detection and $27,375 in milking labor. And reduction in labor management time for the owner was valued at $3,650. The total decreased expenses equaled $33,763 and when added to increased incomes gave a total positive impact of $88,831 by adopting AMS.

On the negative impact side only increased expenses are entered as no decreased incomes are expected. The capital recovery cost of the robots includes the depreciation and annual interest cost of owning the AMS. Depreciating the AMS out over ten years and charging 5.5 % interest against the purchase value yields a cost of $57,100 annually.

Increased repair and insurance costs stems from an annual maintenance contract on the AMS and the additional value to insure the AMS at total of $12,350. Additional feed costs of $19,760 come from the dry matter needed to produce the additional milk along with changes in total TMR costs due to pelleted feed and/or individual feeding of cows in the AMS. This producer expected a $0.001 cost reduction per pound of dry matter. Due to one % decreased cull rate, heifer replacement costs decrease $2,240. Increased utilities, mainly from electricity, add $945 while increased records management labor adds $1,825. Total increased expenses and total negative impacts are $89,740.

Net financial impact, positive minus negative impacts, is calculated at $-909 for this example. But, quality of life improvements from a flexible management schedule and not being tied to an early morning milking schedule is valued at $10,000. And, valuing the ability to micro manage the herd with the herd record system at another $3,000 annually, the net impact becomes $12,091.

So, the adjusted value of the AMS depends heavily on the variables used, value of the quality of life, and ability to profit further from the management software.

Automatic Calf Feeding Systems: Is this Your Next Employee?

Jennifer Bentley, Dairy Specialist, Iowa State University Extension and Outreach

Individual calf hutches have historically been the industry's preferred management system for pre-weaned calves. This management system is highly labor intensive and allocates the majority of the labor attention on feeding and cleaning up after each individual calf. Automatic calf feeding systems have been introduced as a way to reduce labor as well as reallocating labor to monitor and manage calf health and performance on a more flexible schedule. Well-managed group housed calf rearing systems can provide advantages for both calves and producers.

Automatic calf feeders consist of a self-contained unit which heats the water, dispenses a programmed amount of milk replacer, mixes the milk replacer and water in a container from which the calf can suck it out through a nipple feeding station. There are numerous companies selling automatic calf feeders in the U.S. that vary widely in sophistication and price, ranging from systems which record minimal data and have simple feeding programs to more involved systems with extensive capabilities to program feeding plans and monitor calf performance.

Automatic Calf Feeder Facts:

- One mixing station will handle up to three or four nipple feeders. Each nipple feeder will feed approximately 20-30 calves or 10-15 veal calves depending on the age of the group. More calves per feeder results in greater competition for the nipple and an increased rate of intake.

- Calves are fed 0.5-2.0 L per feeding over four to eight feedings per day. When calves are limit-fed milk (less than 1.5 lb per day) calves spend more time in the feeder without being rewarded with additional milk. Also, when milk allowances per feeding are small (one pint or less), calves remain in the stall longer without being rewarded. There are usually about one to two hours between each feeding. Calves will spend about 30-50 minutes/day at the feeding station. Calves will not consume much, if any, for about six hours during the night.

- Automatic calf feeder software can monitor milk intake of individual calves, number of visits, number of unrewarded visits, as well as the rate of milk consumption. Any changes in individual calf feeding behavior are alerted to the manager to diagnose illness or failure to adapt to the system.

- Weaning can occur automatically at a pre-set age by reducing the number of feedings per day and the amount of milk or milk replacer offered over a predetermined period of time, usually one week.

- Group-housing allows for early socialization which is important in social development as the calf matures into a cow. However, some negative behavior can occur such as cross-suckling, competition around the feeder, and dominance behavior can occur if the system is managed improperly.

Considerations for increased Automatic Calf Feeding Effectiveness:

Many factors must be considered when utilizing an automatic calf feeding system. Here are some considerations in barn and auto feeder design:

- Aggressive colostrum management (quality, quantity, quickness, and cleanliness)
    - Consider routine monitoring of serum proteins to assess colostrum program

- It is still necessary to feed the calves by bottle in individual pens for the first 3-10 days. It has been noted in Europe, calves are put into the group pen after first feeding colostrum. The producer must still go inside group pen to feed second feeding colostrum. Moving calves onto feeder at less than 6 days may require more effort to train calves to the feeder. There appears to be less risk of respiratory disease when delayed to feeder until 10-14 days of age.

- Adequate resting space (25 sq ft bedded, 35 sq ft total area per calf and over 40 sq ft needed if working with retrofit building with low ceiling)

- Adequate ventilation for good air hygiene (air exchange of 20cfm, 60cfm and 130cfm in cold, mild, and hot weather conditions, respectively.) Considerations of building design, curtains, and positive pressure tube systems should be discussed with an Ag engineer before group housing is considered.

- Design a stall that prevents calves from displacing one another to maintain milk intake and discourage competitive behavior.

- Closely monitor and clean the powder and additive outlets, calibrate powder and additive delivery, monitor and replenish cleaning solutions, examine water supply, inspect the delivery hose and nipples, monitor and follow up on collected calf feeding data. Basic systems require more manual cleaning, while the more sophisticated systems have automated cleaning functions.

Nutrition & Growth Performance:

- In conventional fed calves (pails or individual bottles), calves are fed limited amounts of milk replacer fed two-three times a day. Increasing the feeding rate and the number of portions fed per day may improve body weight gain, starter intake, feed efficiency, and an increase in survival of calves through their first lactation.

- Studies have shown variable growth performance results on calves on automatic calf feeder systems. Some studies have shown improved weight gain when computer-fed, some show no significant difference in growth of calves on automatic feeders or individually fed, and others have demonstrated lower growth rates and feed intakes compared to calves kept individually and fed twice daily. In each of these studies, group sizes were small in comparison to industry recommendations for computer-controlled calf feeders.

- Number of meals will vary by the system. A basic auto calf feeder with a small mixing bowl provides meals of 1 pint per visit. Using a basic system exceeding 1-1.5 gallons daily will require numerous daily visits to get the daily allowance (>12). In other systems, calves are limited to a maximum amount per visit and feeder will mix multiple batches of liquid up to the maximum.

- Feeding programs will vary depending on the system. The basic systems are programmed to provide all calves with similar meal sizes and daily allowances, regardless of age. The more sophisticated systems allow a more defined feeding program that gradually increases over several days and then decreases milk allowances closer to weaning.

- More sophisticated systems enable the use of pasteurized waste milk in addition to the milk replacer. However, this creates another set of management challenges for storing, cooling, and feeding. These systems also allow for dry or liquid medication, additional electrolytes, antibiotics, or other therapies individually.

- Calves will spend an average of 60 days in the auto feeder if assumed they come in at 5-10 days of age. The weaning process would start at about 49 days (7 weeks) and wean by 56 days (8 weeks) or when the calf is consuming 2-3 pounds of calf starter for 2 days. This would allow 25 calves/pen/year with two pens for a total of 300 calves on the feeder per year.

- De Passille et al. (2004) showed that group calves were able to be weaned earlier (35 days old) than bucket-fed calves (42 days old), resulting in 18 percent less milk replacer fed to calves using the automatic calf feeding system verses bucket fed, individually housed calves. Starter grain was also fed automatically in this study, which allowed for complete milk and grain intake.

Other Considerations:

- Excellent calf management is necessary even before calves are born starting with high quality feed and care for pregnant cows.

- Calves should always be grouped by age and size for optimal growth. Keep age ranges to less than 3 weeks to allow younger calves to compete at the feeder.

- Free choice water should always be available. Locate the waterers several feet away from the starter bunk.

- **Cross-sucking behavior:** Feeding calves milk via an artificial teat allows them to exhibit a natural sucking behavior. Hammell et al (1988) stated that satiation (the feeling of fullness) with milk alone does not eliminate the sucking stimulus, thus even if the calves nutritional needs are met it still feels the need to suck. Artificial teat-feeding helps the calf feel satiated because the sucking stimulus has been shown to increase levels of cholecystokinin (CCK; a mediator of natural satiety) and insulin over bucket fed animals, making teat fed animals feel more satiated. It also takes longer for the calf to feed and thus the time spent feeding is closer to normal which will also decrease the likelihood of cross-sucking.

Cost of an Automatic Calf Feeder:

- A basic auto feeder system costs approximately $1600-$2400 with each unit capable of feeding up to 25 calves.

- An auto feeder including more of the management tools and computerized system costs approximately $15000-$17000 for a unit that includes two feeding stations, software, and the capability of adding two more feeding stations with slightly more cost.

- Other costs associated with auto calf feeders include construction of group housing or retrofitting of an existing structure.

Proper Management Mindset:

Producers considering this technology should have the following management behaviors:

- Data oriented

- Evaluate management information each morning and periodically throughout the day

- Calf managers should still "walk" the pens to evaluate calf behavior and watch for signs of illness

- Labor efficiency should improve with an auto calf feeder, however time that was normally spent physically feeding the calves is now spent reviewing reports, walking the pens, and cleaning the feeder.

ISU Research: Colostrum Quality

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Maternal colostrum **(MC)** provides the neonate with immunoglobulins **(Ig)** essential for passive immunity and health. Bacterial contamination of MC is another critical quality parameter. Bacteria in MC may bind free IgG in the gut lumen or block uptake and transport of IgG molecules into the enterocytes, thus reducing apparent efficiency of IgG absorption.

Current industry recommendations include discarding MC that contains < 50 mg IgG/ml and > 100,000 cfu/ml total plate count **(TPC)**. <u>Objectives of this study were to</u> 1) determine the IgG concentration and bacterial composition of MC available on U.S. dairy farms 2) differences in MC across regions, storage methods, breeds and parity and 3) estimate percentage of MC available that meets industry standards for both IgG concentration and bacterial contamination.

Dairy farms (n = 67) in 12 states participated in the study. States were grouped into 4 regions: Northeast (NH, NY, PA), Southeast (FL, GA, VA), Midwest (IA, MN, WI) or Southwest (AZ, CA, TX). Samples were collected based on availability of MC at the time of site visit.

MC was sampled from individual cows or from multiple cow pools according to normal management of the farm. Samples were classified based on storage prior to feeding: fresh, refrigerated, or frozen. 827 MC samples were analyzed.

Table 1. Percentage of samples meeting one or both industry recommendations for colostrum quality

Quality	n	%
> 50 mg IgG and < 100,000 TPC	294	39.4
> 50 mg IgG and > 100,000 TPC	233	31.2
< 50 mg IgG and > 100,000 TPC	104	14.0
< 50 mg IgG and < 100,000 TPC	115	15.4

Overall, 70.6 % of samples were above 50 mg IgG and 54.8 % of samples < 100,000 cfu/ml TPC. Combined, only 39.4% of all colostrums samples met both industry recommendations for colostrum quality.

Regionally, the samples collected in the Midwest had the greatest IgG concentration, greatest percentage of samples containing > 50 mg/ml IgG, and greatest % of samples with < 100,000 TPC.

The IgG concentration increased with parity (42.4, 68.6, 95.9 mg/ml in 1st, 2nd, and 3rd and later lactations, respectively). No differences in IgG concentration were observed among breeds or storage method.

Highest % of samples with TPC < 100,000 were found in fresh and frozen samples. Data collected from this study indicates that a large percentage of calves are being put at risk for both FPT and pathogen exposure when fed MC currently available on US farms.

This emphasizes the importance of monitoring colostrum Ig quality (colostrometer and/ or refractometer) as well as protocols to ensure clean equipment and proper harvest, storage, and feeding methods. Results from the study have been submitted to the Journal of Dairy Science. A complete technical report including analysis of all components can be found at:

http://www.ans.iastate.edu/report/air/2012pdf/R2711.pdf