

Kentucky Dairy Notes

November 2013



Precision Dairy Meeting Provides New Insight into Technology Use

Matthew Borchers and Jeffrey Bewley

Dairy farms are highly technical businesses, and the extent to which that is true was apparent at the 2013 Precision Dairy Conference that took place in Rochester, Minnesota, June 25th-27th. Over 500 people from around the world were in attendance, with technology manufacturers, researchers, and specialists being among the main conference constituents. Presentations, talks, exhibits, and tours included information on the most recent developments within research and development of precision dairy technologies. Highlights of information presented from the most recent research follows.

Lameness Detection

Another Israeli study focused on development of a lameness detection technology through a model using posture, movement, cow activity, rumination, and milk production using 1,100 Holstein cows equipped with technologies. Cow gait was monitored with a depth image camera and were compared to daytime visual scores. Scores based on posture and movements were used in logistic regression models. A model that used all four scores, and introduced the behavioral and production measurements from the other sensors proved to be beneficial. When used in a model to predict lameness, behavioral loggers, production loggers, and imaging cameras were useful in predicting lameness in cows.

Body Condition Scoring

A third study in Israel was designed to create an automatic body condition score (BCS) monitoring technology. Images viewing the tops of 151 dairy cows were collected to automatically calculate BCS from several contour points on the cow bodies. The scores calculated from the computer were compared to manual scores assigned by researchers. The results suggest that it is possible to automatically calculate BCS from camera images and this technology could have the potential for commercial farm implementation. Many previous studies have shown the value of assigning body condition scores and this technology could remove the potentially laborious task of assigning these scores.

Implementation of Activity Systems

A presentation by Dr. Ray Nebel outlined some of the current commonalities, differences, and trends in relation to activity and health-based precision technologies. Implementation of these technologies has increased in the past few years. This trend is attributable to advances in technology and the increasingly affordable nature of activity monitors. Activity-based technologies have many differences, but all have similar components to their systems. Each technology includes the individual cow sensors, the hardware receiver to collect data from the sensors, and the computer software. Where these technologies differ is in the algorithms generating data. Many of the variables differ, and how technologies arrive at their final user reports can be very different. The producer should take into account how technologies monitor activity. Additionally, some technologies have differing levels of accuracy and numbers of false-positives, which should also be taken into consideration by dairy producers.

Producers investing in activity monitors will experience different levels of return on their investment. It is important that producers consider working closely with a reproductive technology expert to help them manage the system and utilize the technology to its fullest potential. According to Dr. Nebel, "common results of implementing an activity system into the reproductive management program are reduced calving intervals, increased estrus detection and conception rates, increased palpation pregnancy rates, and a reduced reliance on timed A.I. protocols". Dr. Nebel also claims that this is done while also reducing the number of injections used in timed A.I. protocols. In closing, it seems that if used

properly, activity-monitoring technologies will allow producers to become more efficient in their reproductive programs. This will cause an increase in profitability by decreasing the number of reproductive based culls made on the farm.

Connecting with Cow Comfort Elizabeth Eckelkamp and Jeffrey Bewley

Researchers from around the world gathered in Indianapolis, Indiana at the 2013 Joint Annual Meeting of the American Dairy Science Association and the American Society of Animal Science. Five days of posters and oral presentations covered a variety of topics, several focused on dairy cattle behavior and public perception, the highlights of which are listed below.

What does the industry say?

Dairy cattle welfare continues to be an issue in multiple countries. Canadian researchers held a forum between industry leaders, researchers, veterinarians, dairy specialists, producers, and students to pinpoint concerns in the modern dairy industry.

Five evenly mixed groups held 1-hour conversations, which were recorded then written out word for word. Identification of five common themes occurred: cow pain and suffering, cow vulnerability, animal behavioral restrictions, milk production and economics, and public perception. Lameness was identified as a concern in both pain and suffering and production and economics. Other common concerns included injuries, cow comfort, dehorning, disease, freedom, poor handling, high mortality, cull cows, and the life of a calf after weaning. Recommendations for the future included finding out what the public thinks about the industry.

Take home message: Discussions among all factors of the dairy industry help pinpoint potential public perception concerns before they become major media issues. This may improve the overall public opinion of farmers and production facilities.

Influence of lying time on cattle well-being

Several presentations dealt exclusively with bedding surfaces, and their effect on overall lying time.

A University of Kentucky study investigated the effect of waterbeds and rubber filled mattresses in a newly renovated barn on daily lying time, milk yield, and rumination time. The freestalls were updated to the industry standard size for the largest Holstein in the university herd. All cows in the study were fitted with IceQube sensors (IceRobotics Edinburgh, Scotland) to monitor lying time. The study noted a significant difference between the two surfaces on lying time and rumination time. Cows on waterbeds increased lying time by 47 minutes/cow/day, decreased daily rumination time of 15 minutes/cow/day, and maintained a lower hock score. No difference was seen between the stall surfaces on daily milk yield.

Another Canadian study delved into the effect of stall surface on lying time. This study involved gel-filled mattresses, foam pads, and the differences in compressibility. Eighteen non-lactating Holstein cows received a 24hr free choice period on the surfaces monitored by video and accelerometers. Over the next 6 days, cows were restricted to one of the surfaces for 3 days at a time with the same monitoring system. Lying time increased by 35 minutes on the gel mattresses, with a shorter time to move from a standing position to a lying position, lower standing time, and reduction in standing with the front legs in the stall and the rear legs in the alley.

University of Minnesota researchers investigated the effects of feed bunk stocking density on lying time in cows 4 weeks prior to calving. The two stocking densities tested were 80% and 100% on paired groups of first calf heifers and cows. First calf heifers spent more time lying at the lower stocking density, however cows at the higher stocking density spent more time lying than cows at the lower one.

Take home message: With increasing comfort and compressibility of lying surface, daily lying time increases and hock scores improve for lactating and non-lactating cows. The effect of stocking density on close-up dry cows is dependent on age, with mature cows lying longer at 100%, and first calf heifers at 80%.

What dairymen are doing

Researchers in Canada started the Dairy Cluster Project. The primary focus was improving cow comfort to increase cow longevity in tie-stall and freestall barns, and to identify any barriers that limit producer adoption of changes that may improve these factors. The initial study compared animal-based measures (lameness, hock injury, lying time, and body condition), stall and facility design, and a management questionnaire (cleaning and feeding routine) from all farms included on the study. All data was analyzed, and farmers were benchmarked based on the averages of other farmers in their area. Precise feedback was given to all participating farmers on each of the study measures to aid farmers in targeting areas that could be improved including: bedding management, stall bases (increased compressibility, correct stall size for largest cows), and hoof-trimming schedule.

A follow-up interview was conducted a year to year and half after the original visits. Any changes made by the farmers were documented, along with any barriers or challenges that hindered or prevented improvement. Many of the changes included lower stocking densities and lameness management such as footbaths and identification of lame cows. Twenty seven percent of farmers did not make any changes. This was due to lack of funds, satisfaction with where they fell in the benchmarking, or lack of information and help to change.

Take home message: Benchmarking seems to be a helpful tool for showing how cow comfort practices affect other measures on a dairy farm such as longevity and lameness. The largest roadblock to adopting changes to improve cow comfort was lack of funds, followed by satisfaction with their current standing in the benchmarking process, and finally lack of information on how to change and help to make it happen.

Many Potential Uses of Yeast Maegan Weatherly and Jeffrey Bewley

The 2013 American Dairy Science Association annual meeting was held in Indianapolis, Indiana in early July. Animal scientists from all over the world gathered to discuss wide-ranging topics of importance to animal agriculture. One such area of interest, especially with regards to dairy cattle, was feed supplements. More specifically, many posters and presentations focused on the inclusion of yeast in cow or calf diets to observe a variety of results. A few of these abstracts will be discussed in this article.

Transition Cow Health

One of the areas of most interest with regard to yeast supplementation and dairy cattle at this meeting was the effects of yeast on transition cow health.

Study 1. Researchers from Oregon State University conducted a series of studies testing multiple facets of the fresh cow approach of yeast supplementation. In the first study, researchers fed a group of cows 0, 56, or 112 g of a yeast fermentation product 28 days before the predicted calving date. They collected blood samples around the time of calving and examined the serum for immunity markers such as haptoglobin, serum amyloid A, and immunoglobulins.

They discovered that cows consuming either amount of the yeast product tended to have lower concentrations of serum amyloid A in the last week before calving but saw increased levels of this immunity marker in the first week after calving. Furthermore, cows fed 112 g of yeast experienced lower haptoglobin concentrations than cows on the 56 g treatment. Finally, cows receiving either of the yeast treatments experienced lower serum concentrations of IgM.

The authors conclude this study by stating “our results suggest that feeding *Saccharomyces cerevisiae* (yeast) fermentation product may alter immune function during the transition period.” The important take-home message from this study is that with regard to immunity, whether it is innate or passive, yeast may alter the concentrations of these particular markers during this critical time in a cow’s life. Producers should be aware of this if they are considering supplementing their cows with yeast during the transition period. (Shriver-Munsch et al., 2013).

Study 2. This study was conducted in conjunction with the above study at Oregon State University. Again, cows were fed 0, 56, or 112 g of a yeast fermentation product and blood samples were collected both before and after calving. The purpose of this study was to examine whether or not

supplementing yeast affected the macromineral status of fresh cows. Researchers gathered blood samples periodically throughout the experiment beginning 21 days before calving and ending 21 days after calving. They examined the blood serum for calcium, magnesium, and phosphorous.

They found that cows on the yeast supplement did experience increased serum concentrations of phosphorous throughout the entire treatment as well as an increase in calcium around the time of calving. These results suggest that yeast supplementation could be a simple way to help decrease the incidence of milk fever in fresh cows. However, the researchers observed a decrease in the serum concentration of magnesium of cows supplemented with yeast which could increase the symptoms associated with milk fever. So producers and their nutritionists should be aware of this when making decisions about using this supplement. They conclude this study by stating, "feeding yeast may be beneficial in supporting the macromineral status of transition cows." It is important to note their finding that doubling the amount of yeast fed from 56 to 112 g did not significantly alter serum concentrations of the macrominerals studied in this experiment suggesting that the 56 g treatment would be sufficient (Fadden et al., 2013).

Study 3. The final study in this series from Oregon State University presented at the meeting involves fresh cow feed intake and yeast supplementation. As previously mentioned, cows on this study were fed 0, 56, or 112 g of a yeast supplement daily. Their objective was to "examine how feeding yeast may improve feed consumption in dairy cows." In a previous study done by these researchers, they found that supplementing yeast to dairy cows increased feed consumption but with this study, they wanted to understand exactly why that happened. In order to do so, they collected blood samples periodically from seven days before calving until seven days after calving.

They measured serum concentrations of markers of stress (cortisol), inflammation, hunger, and energy status. The researchers found that cows on the yeast supplement tended to have decreased levels of cortisol. They concluded by offering the suggestion that feeding fresh cows yeast may result in an increase in feed intake due in part to a decrease in cortisol secretion and therefore stress. It appears that further evidence is necessary to explain exactly why that is the case or what benefit this could have if used properly (Zaworski et al., 2013).

As you can see from these three transition cow studies, supplementing cows with yeast can potentially have positive benefits on cow health and productivity. Yeast alters a wide range of production factors in cows including immune function, feed intake, and macromineral status to name a few. Yeast supplements can be beneficial but it is up to the producer to decide if the effects of the supplement are substantial enough to incorporate it into the diet of the herd, or the transition ration.

Heat Stress

Researchers in Brazil considered yeast supplementation effects on heat stressed cows. The purpose of this study was to understand the effects that a yeast supplement could have on feed intake and digestibility in heat stressed animals. These researchers evaluated 28 Holstein cows receiving either a control (no yeast) treatment or a yeast (10 g) treatment for approximately 70 days. The temperature humidity index was above 68 for 75.6% of the time during this project.

They found that cows on the yeast supplement actually experienced an increase in milk yield (2.9 lbs/day milk) and solids (especially lactose). However, yeast had no significant effect on the daily intake of digestible organic matter, total tract digestibility of nutrients, urinary allantoin excretion, ruminal pH and protozoa content, chewing pattern, and dry matter intake.

On days 71 to 73, researchers replaced citrus pulp in the diet with corn in order to induce acidosis. Upon successfully lowering the pH of the blood, they noticed that cows on the yeast treatment actually experienced a significant increase in blood pH. These researchers concluded the experiment by stating, "yeast supplementation improved milk yield of cows under heat stress, but not diet digestibility." Based on these results, producers may choose to supplement cows with yeast during times of heat stress in order to potentially increase milk production. (Salvati et al., 2013).

All of these studies, which examined yeast as a feed supplement in dairy cattle diets, were presented as posters during the poster symposia throughout the week at the ADSA/ASAS meeting. According to the above poster reviews, yeast can be supplemented to animals in just about any stage of life with impacts reaching multiple production goals.

2013 4-H Dairy Judging Team Places Fifth at National Contest

Larissa Tucker and George Heersche, Jr.

The 2013 Kentucky 4-H Dairy Judging Team members are Caleb Fulkerson, Tyler Goodlett, Drew Krueger and Shelby West. All the team members are from Spencer County. This team had an exceptional fall.

The team participated in the Pennsylvania All-American Contest on September 9, 2013. The team placed fifth overall in the contest. The team also placed fourth in Ayrshire, fourth in Brown Swiss, second in Holstein and fifth in oral reasons. Tyler Goodlett was second high individual in Holstein, fifth high individual in oral reasons and second high individual overall in the 4-H division. Shelby West was fifth high individual in Brown Swiss. Drew Krueger received fourth high individual in Holstein.

The National 4-H Dairy Cattle Judging Contest was held September 30th, in Madison, Wisconsin at the World Dairy Expo. Once again the team received fifth place team overall in the contest. They received a pen set and medallions sponsored by Zoetis. They were also the first place team in Brown Swiss and received plaques sponsored by the Brown Swiss Association. In Holsteins the team placed second, and finished in the top ten in Ayrshire, Jersey and Oral Reasons.

As individuals the team members all excelled. Tyler Goodlett and Shelby West were named to the All-American club. They will be eligible for future scholarships. Tyler had an outstanding day; he was fourth high individual overall in the contest and received the third high individual in total placings only. Tyler also received second high individual in Brown Swiss, and third in Holstein. Shelby was the twentieth high individual of the contest. She placed twelfth in oral reasons, and thirteenth in Brown Swiss. Caleb Fulkerson was third in Brown Swiss. Drew Krueger was fourteenth in Ayrshire.

There are several people that we would like to thank for their continued support of the Dairy Judging program. First we want to thank the University of Kentucky Coldstream Dairy crew and herdsman Joey Clark for hosting the State 4-H Dairy Judging Contest each year. The following breeders served as hosts for the workouts: Fairdale Brown Swiss, and Alpine Hill Swiss. We also thank the following sponsors for all their help and financial support: Farm Credit Services of Mid-America, Oliver & Virginia Payne 4-H Dairy Endowment, Dairy Farmers of America, Kentucky Jersey Cattle Club, Neogen, Kentucky Dairy Development Council, Kentucky Department of Agriculture, Louisville Area Jersey Cattle Club, Select Sires of MidAmerica, Venture Grant by the Kentucky 4-H Foundation, and Kentucky State Fair.



First Place Team in Brown Swiss (left to right): Bland Baird, coach; Larissa Tucker, coach; Caleb Fulkerson, Drew Krueger, Shelby West, Leonard Johnson-Brown Swiss Association and Tyler Goodlett

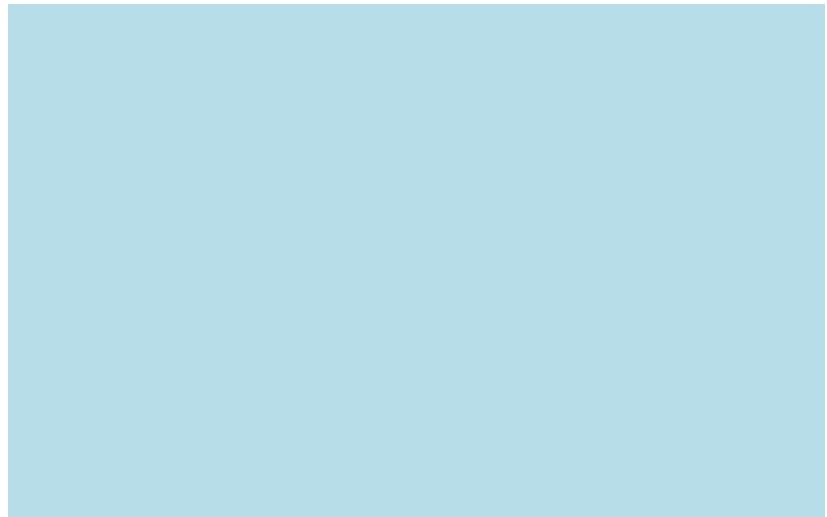


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Kentucky Dairy Partners Meeting

February 25-26, 2014

Bowling Green, KY