

Undergraduate Student Competition: ADSA-SAD Undergraduate Competition: Dairy Production

147 Cow comfort: An important element of the 21st century dairy operation. A. Gibson* and L. Fox, *Washington State University, Pullman.*

Cow well-being is becoming an essential element of management in the modern dairy business. Cows that are given adequate and clean space to rest and eat appear more comfortable and will produce more milk. Cow well-being is also a societal concern. The public wants to be satisfied that their milk comes from healthy and well-treated animals. Producers can use cow well-being assessment tools such as the body condition score, locomotion score, and hygiene scores. Dairy managers can also observe cattle handling, and adjust the surroundings for heat stress to create the most ideal environment for the cow. Through careful observation of factors that can cause stress in the cow's life farmers can then locate the bottleneck that prevents optimum cow comfort and then alleviate that bottleneck. Inherently, cow well-being is an important aspect of the modern dairy. Uncomfortable cattle are less productive as they have decreased feed intake, and thus decreased production, and increased reproduction and disease problems. Minimizing stressful conditions for dairy cows is not only important economically but it is also good for public perception.

Key Words: cow comfort, welfare, cow well-being

148 Thermal variation effect on dairy calf rearing. A. C. Thompson*, D. M. Amaral-Phillips, and J. M. Bewley, *University of Kentucky, Lexington.*

Calves are the future productive units of a dairy herd. The herd's future performance, current and future earnings are based on their growth. Dairy calves are expected to double their birth weight from birth to 2 mo. Fluctuations in environmental temperatures and humidity affect how well a calf grows. One key to raising well-grown calves is a clean, draft-free, and well-ventilated environment. Temperature extremes outside of a calf's thermal neutral zone negatively affect growth and immune function. Calves begin to experience heat stress at temperatures exceeding 21°C. To reduce the effects of heat stress, ventilation, shade, and water need to be provided. According to Hill et al. (2011), ventilation with fans increased ADG ($P < 0.05$) and feed efficiency ($P < 0.05$). Shade allows the calf to grow while reducing the amount of energy expended to curtail heat effects (Spain and Spiers, 1996). Any energy that a calf uses to maintain their thermal neutral zone is energy diverted from growth. As ambient temperatures drop below 15°C, newborn calves begin to experience cold stress because they lack the fat stores necessary to stay warm. Calves older than 3 wk begin to experience cold stress at temperatures below 7°C because they develop fat stores as they age. During cold stress, the calf's energy requirement for maintenance increases. Additional dry bedding and draft-free ventilation alleviate the added stress. A calf provided deep bedding will nest creating a warmer microenvironment in contrast to bedding with sand or sawdust (Lago et al., 2006). This lowers the amount of energy the calf expends staying warm. According to Nonnecke et al. (2009), extra nutrients are needed for calves in cold environments to maintain growth similar to a warm environment. With colder temperatures, additional milk or milk replacer is needed to maintain growth. Minimization of environmental effects and additional nutrients from milk ensures that a calf doubles her birth weight by 2 mo.

Key Words: environmental temperature, stress, dairy calf

149 A survey on the challenges and opportunities regarding the transition from conventional to automatic milking systems in the northeastern United States. A. R. Ervin*, R. Peters, T. McCoy, and K. M. Moyes, *University of Maryland, College Park.*

As herd size increases, new technology that allows small-to-medium-sized dairy farmers to remain sustainable is greatly desired. Automatic milking systems are one way farmers can remain competitive and sustainable via improving management and production efficiency, as well as enhancing quality of life and business attractiveness to successors. The objective of this survey was to identify the interest and factors that are important to small-to-medium-sized dairy farmers when considering transitioning from conventional milking systems to AMS in the Northeast region. In January 2013, over 1330 questionnaires were sent to Maryland and Pennsylvania dairy producers having between 80 and 250 lactating dairy cows. The response rate was approximately 35%. Of the producers that completed the surveys, 33% expressed interest in transitioning to an AMS. Of the producers that expressed interest, 53% were between the ages of 50 and 64 and 45% possessed a high school diploma or graduate equivalency degree (GED). Return on investment/profitability, improving management of family time and improving herd management were the most important factors regarding their interest in AMS. Return on investment/profitability, financing/cash flow and barn design are the top 3 factors influencing dairy farmers' interest and concern when considering transitioning to AMS. Twenty-one percent of producers said they have access to information regarding changes in barn design, whereas 18.0% said they have access to information regarding changes in animal health/productivity and financing. Producers said more information on barn design, animal health/productivity and economic impact would be helpful when considering a transition to AMS. Results will serve as the basis for education programs designed to provide farmers with the decision-making tools required to estimate and quantify economic impacts, performance outcomes and lifestyle changes associated with AMS.

Key Words: dairy cow, survey, automatic milking system

150 Sexed semen, genomics, and crossbreeding as tools for increasing the value of dairy herd genetics and cull dairy animals. T. L. Boyd*, D. R. Winston, and B. G. Cassell, *Virginia Tech, Blacksburg.*

Sexed semen and genomic testing are recent developments in the dairy industry that have gained in popularity since their introduction, both in registered and commercial herds. As many farmers look for new ways to increase profitability in the face of increasing production costs, the cost-benefit ratio of these technologies is sometimes questioned. To maximize their value, crossbreeding has been suggested as a third tool to create a more valuable end product—cull dairy calves—while increasing the genetic value of those animals remaining in the milking herd. This is achieved by breeding genomically inferior heifers to beef semen, which creates a marketable product (half-beef, half-dairy bull and heifer calves) while keeping bad genetics from remaining in the herd. It can also reduce some semen costs, since good, expensive dairy bulls are not wasted on poor females, in addition to reduced health costs

due to fewer incidences of dystocia. The downside is that it requires expenditures in time and effort to implement, and it is a relatively new concept for commercial herds. The value of such a system was analyzed via meta-analysis by comparing traditional cull values with those produced by this system. The value of these culls was determined by comparing both the costs incurred by increased semen costs, genomic testing, and decreased fertility and the benefits of greater more valuable cull calves, more accurate culling, and superior replacement heifers. The analysis indicates a cost of approximately \$20 per contemporary member of the breeding group, although management techniques can turn this into a net profit.

Key Words: sexed semen, genomics, crossbreeding

151 What lies within the rumen? S. M. Vignes* and C. C. Williams, *Louisiana State University, Baton Rouge.*

Subacute ruminal acidosis (SARA) is characterized by a sustained rumen fluid pH below the normal 5.8. Many factors can attribute to the pH dropping below this level including diet particle size, dietary carbohydrate concentration, limited saliva production, and water intake. Rumen microorganisms break down readily fermentable carbohydrates which lead to the production of volatile fatty acids (VFA) and lactic acid. In turn the ruminal fluid's pH is lowered. Acidosis can lead to the microorganisms in the rumen being harmed or becoming obsolete altogether as well as the absorptive papillae being damaged. SARA is of concern in mature dairy cattle but also in the growing calves. It is widely known that the first 24 to 36 h after a calf is born is the most crucial time to feed colostrum to ensure passive immunity. Once calves are transitioned onto their liquid feeding program, they should also be provided with high quality calf starter not only to provide nutrients but to promote rumen development. The starch and sugars provide the readily fermentable carbohydrates for production of VFA which help develop the rumen. With this practice though, subacute acidosis could occur as production of the VFA and lactic acid lead to the decrease in pH. This is a problem because the earlier weeks are the most vital time for initiating rumen development, and a fine line is being walked between beneficial and detrimental. The rumen must be provided for, but too much grain could result in SARA due to low rumen pH. Low rumen pH impairs fiber digestion by inhibiting the growth of cellulolytic microorganisms. Research has shown subacute rumen acidosis to be common among calves, but has it become a normal event?

Key Words: acidosis, calves

152 Rumination monitoring: A management tool for early detection of metabolic disorders. K. Carraway*, M. Brauneis, N. Engwall, and J. Fain, *Clemson University, Clemson, SC.*

Rumination monitoring is an important tool for dairy herd management as it is a direct reflection of cow health. Monitoring rumination rate has the potential to be utilized in an array of practices from heat detection to metabolic disorder diagnosis. Until recently, monitoring rumination has been achieved by visually monitoring cow activity, which is time consuming and lacks accuracy. Recently, SCR Engineers Ltd. of Israel released the HR-Tag, a rumination collar that has changed the way producers can manage their herds. The neck collar is equipped with a built in motion sensor, microphone, and processor for recording rumination rates, chewing rhythm, and general movements. A scanner then transmits the recordings to a computer data system that keeps an activity report of the entire herd. By sensing a drop in rumination rates, the rumination collar is able to detect metabolic disorders such as ketosis, acidosis, dis-

placed abomasums, as well as mastitis. This tool is especially useful in transition animals, a phase corresponding to a time when these disorders are most prevalent. Early detection allows producers to quickly begin remedial therapies that in turn reduce the costs associated with potential advanced treatment and production loss. Additional cost reduction may be realized through identification of a disorder's subclinical manifestations. There are some limitations that hold back the HR-Tag from its full potential. The cows must be near the transmitter to allow data to be sent to the computer, and any data not sent is lost in 24 h. Decreases in rumination are not always associated with illness or heat, and must be crossed checked with milk records for validation. Additionally, the cause of the drop in rumination is something that must be further investigated, for the exact disease or reason is not given. Proper placement of the tag is crucial for accurate readings, and that is difficult to achieve with some animals. Despite these minor setbacks, studies show that with proper training and experience, rumination monitoring is a highly effective and accurate way of detecting early illness, making it a valuable tool for herd management.

Key Words: rumination monitor, metabolic, management

153 The Fodder System. K. Supa* and B. Richards, *Delaware Valley College, Doylestown, PA.*

The Fodder System is a hydroponic system used to produce a fresh feed source for domestic animals. This new system was developed in Australia and introduced into the United States in 2009. The system will convert grain or legume seeds into a fresh feed source in 6 d. The end product or mats consist of the roots and the greens of the plants. The seeds are grown in a controlled and sterile environment which decreases the development of fungus or molds. A wide variety of seeds can be grown in the Fodder System to maximize the benefits of feeding the product. This unique management style using this system allows agricultural producers to deliver a feed source to their animals that is consistent and nutritious. Animals are fed a mat that includes the roots, which makes the feed source 70% digestible, according to the Fodder Systems website. This type of system is labor efficient and reasonably priced for the system. The cost of the system is affordable when compared with the high cost of equipment to make traditional forages. Less equipment also means less money for repairs on harvesting equipment. Another benefit to the fodder system would be the ability to farm on a smaller land base, thus allowing us to produce more quality feed with less foot print on the environment. The Fodder System provides a high quality feed product that can offer many benefits to agricultural producers in the United States.

Key Words: Fodder System, hydroponic, legume seeds

154 Effects of group housing and pairing calves before weaning. D. L. Grove* and D. R. Olver, *Pennsylvania State University, University Park.*

In the United States, the traditional way of raising calves has often been to house them individually until weaning and then group them together. This was thought to prevent the spread of disease and allow management of each individual calf. With the advent of automated feeders, group housing of calves before weaning has become more popular. Research from British Columbia showed that calves housed in pairs spent more time eating and had higher intakes of starter shortly after weaning. Pair-housed calves in the study vocalized 3 times less at weaning than individual calves, indicating that the pair-housed calves exhibited less stress. The individually-housed calves took on average 40 h longer

to start eating starter when mixed with other calves at weaning. They concluded pair-housing calves reduces behavioral responses to weaning and improves weaning performance. In another British Columbia study, calves housed in groups struggled less when handled than individually housed calves. These scientists also showed paired calves on a typical plane of nutrition spent more time playing than individually-housed calves with the same nutrition level. This is a positive sign of animal well-being. In a Spain study where calves were grouped either before weaning or else 6d after weaning, calves were 2 times less likely to have

respiratory problems if they were grouped earlier. The early-grouped calves had higher starter intake at weaning in this study. The researchers believe that group housing allows more space for the calves, which reduces stress and leads to fewer health problems. A Canadian study agreed that more access to space may be beneficial to calf health and lead to reduced stress at weaning. All of these studies found a positive increase in animal well-being in group-housed calves.

Key Words: calf, housing