
Before 2009 it required nearly 5 years before the genetic merit of an individual animal was determined. Once genomics was introduced into national evaluations, genetic progress in the dairy industry rapidly increased. The genetic merit of an animal can be determined at a young age and is highly reliable due to the large reference population available. However, the majority of genetic gain has been achieved on the sire side, resulting in genetic lag of cows. One approach to increasing the genetic gain of females is through embryo genotyping. This technology allows producers to make more educated decisions on which embryos to implant. Genotyping embryos, therefore, increases genetic progress by increasing selection intensity. This technology can also identify embryonic defects and genetic recessives to reduce early embryonic loss. Two techniques can be used to acquire biopsies from embryos for genomic testing. The first method is blade biopsy, which can be used for embryos in the late-morula or blastocyst stage sampling cells from the trophectoderm. The second method is ideal for cleavage-stage or morula-stage embryos. This method utilizes a needle to aspirate cells from the embryo; it requires that enough cells be collected to complete gene testing but must ensure there are not too many taken that will compromise the continued development of the embryo. Because sufficient DNA cannot be obtained to conduct a SNP-chip genotyping, enzymatic pre-amplification of the biopsy is required. However, fertility of the genotyped embryos is still a concern. Single-cell gene sequencing is a technology that will be available in the future, which would increase the integrity of the embryos and further the genetic improvement of dairy cows.

Key Words: embryo, genomic selection, embryo biopsy

5 Manipulating circadian rhythms through controlled light-dark phases in the prepartum period on cow performance in the next lactation. A. Rauton* and J. Bohlen, University of Georgia, Athens, GA.

Circadian rhythms, derived from the Greek “circa” meaning about and “dian” meaning day, describe a cycle over a 24-h period, which dictate sleep and wake cycles in most biological organisms. Although many aspects of these rhythms are genetically determined, it has been proven that they can be manipulated by means of food availability, temperature and light. Studies involving circadian rhythms in the dairy cow began with correlations between day length and milk production but have since expanded to include the impact these rhythms have on metabolic parameters, daily activity and hormone production. Since that first development of the positive impact of 16 h of light and 8 h of dark on milk production, there has also been evidence of the positive impact of the light dark period has the ability to positively impact these changes. This expanded to include the impact these rhythms have on metabolic parameters. Since that first development of the positive impact of 16 h of light and 8 h of dark on milk production, there has also been evidence of the positive impact of the light dark period has the ability to positively impact these changes. This study demonstrated that altering the light dark cycle in the prepartum period can impact the subsequent lactation.

Key Words: circadian rhythm, transition, lactation performance

6 Pain management for disbudding dairy calves. A. K. Bitter* and C. C. Williams, Louisiana State University, Baton Rouge, LA.

Disbudding and dehorning calves are common practices in the dairy industry. Disbudding is the removal of the horn before it attaches to the frontal sinus. The most common practice of disbudding is with an electric hot iron. Another common method of disbudding is chemical disbudding via caustic paste, and a less common practice of disbudding is by amputation. Once the horn begins to attach to the skull around 2 mo of age, then disbudding is no longer an option. Dehorning is the process of removing the horn when it fuses to the frontal sinus. There are different methods of dehorning including guillotine dehorner, surgical wire, horn saw, Barnes dehorner, or tippers. Dehorning is a more painful procedure because of the fusion of the horn to the tender sinus above the eyes. In both procedures, the calf experiences pain and discomfort. While these procedures are painful to calves, some reasons for disbudding or dehorning include decreasing the risk of injury to other animals and reducing the risk of injuring workers. Disbudding or dehorning a calf is a painful process, and because of this, more dairy farms are beginning to use short and/or long-term pain management for this procedure to practice better management in their dairy operation. The best time to disbudd a calf is from one to 6 weeks of age because the horn is not yet attached to the skull; therefore, it is less painful for the calf. There are also various ways to control pain caused by disbudding or dehorning procedures. Research has shown that the use of non-steroidal anti-inflammatory drugs (NSAIDs), local anesthetics, and sedation alleviates the pain calves may experience during and after disbudding. Research has also shown that pain management during disbudding results in improved growth and performance of calves. In order for dairy operations to practice better management practices and increase their level of welfare of their animals, they should disbudd their dairy calves from one to 6 weeks of age and use NSAIDs and local anesthesia when disbudding or dehorning.

Key Words: dairy calves, disbudding, pain management

7 Nutritional management of subacute ruminal acidosis in early lactation. M. Mosher* and E. Eckelkamp, University of Tennessee Institute of Agriculture, Knoxville, TN.

Proper nutrition is key to early lactation management, particularly for subacute ruminal acidosis (SARA). Early lactation is one of the most energy demanding periods of a cow’s life. Early lactation marks the end of gestation and parturition and the onset of lactation. Subacute ruminal acidosis is typically defined as the rumen pH dropping below the ideal pH range (6.0 to 6.4) to ≤5.6 for ≥3 h. Low pH can lead to insufficient rumen buffering and decreased production and health issues including: laminitis, gastrointestinal damage, and liver abscesses. Cows with SARA do not exhibit clinical signs leading to missed cases, late diagnosis, or only diagnosing severe cases. Cows with SARA cost the US dairy industry $500 million to $1 billion annually through decreased milk production, decreased milk fat percentage and overall milk quality, and cow mortality. Although treatment is key to all disease management, prevention is key with SARA. Effective SARA prevention relies on proper ration formation. Producers who maintain a forage to grain ratio of 60:40, a high starch percentage, and a low amount of forage neutral detergent fiber can maintain high production with a lower risk of SARA. A grain ratio ≥50% can increase SARA risk and depress milk fat percentage. Too much grain in the diet can lead to excess or abnormal production of volatile fatty acids which can decrease rumen pH. Particle size should also be considered. Particles that are too long
 (>19 mm) or too short (<4 mm) can lead to an increased risk of SARA. Suggested particle size and distribution were ≤8% of ration ≥19mm, 50% of ration between 7mm to 9mm, 20% of ration between 4mm to 7mm, and 30% of ration ≤4mm. Providing a rumen buffer can also help control SARA, such as sodium sesquicarbonate and sodium bicarbonate. Rumen buffers help stabilize the rumen environment and can be used to bring rumen pH back to ideal levels. Through proper nutrition, control of subacute ruminal acidosis can be increased along with cow health and productivity.

Key Words: early lactation, subacute ruminal acidosis, nutrition