
An active compound of citrus oils (CO), citral, contributes to the bactericidal activity of CO and serves as a non-antibiotic alternative candidate for the treatment of bovine Escherichia coli mastitis. During times of inflammation, monitoring the immune response can generate economic and welfare benefits due to the high incidence of mastitis across the dairy industry. The objective of this study was to evaluate the immune response after being challenged with mastitis pathogen E. coli strain P4. Eighteen healthy, multiparous Holstein cows in mid-lactation (>100 d in milk) were challenged with 800 cfu of E. coli strain P4 into one rear mammary quarter. One of 3 intramammary treatments were administered into the infected quarter ~24 h post-infection including: 1) CON: sterile phosphate buffer solution twice daily, 2) CO: 1.0% (vol/vol) citral twice daily or 3) AB: ceftiouf hydrochloride once daily (based on label instructions). Coccygeal blood was collected daily through d 7 post-challenge where serum was harvested. Serum haptoglobin was analyzed using a commercially available kit (Tridelta Development Limited, Dublin, Ireland). Data were analyzed using ANOVA of the PROC MIXED procedure of SAS v.9.4. The results indicated that serum haptoglobin was not different by treatment (P = 0.55) or for the interaction of treatment by day of challenge (P = 0.97). In conclusion, CO does not alter serum haptoglobin response even when compared with the control during E. coli bovine mastitis and CO may not serve as an alternative treatment for bovine mastitis infection with a gram-negative organism.

Key Words: mastitis, citrus oil, alternative treatment

40 Twinning in dairy cattle. M. Travis*, C. Becker, and A. Stone, Mississippi State University, Mississippi State, MS.

The dairy industry continues to push for greater milk production through higher reproductive performance in our animals. A negative effect of this is increased twinning rates. Factors that contribute to twinning in dairy cattle include double ovulation, genetics, season, and management. Cows that experience an extended period in a negative energy balance can have atypical ovarian activities, such as double ovulation and anovulatory repeated follicular waves that can lead to the occurrence of twins (Lopes et al., 2003). High producing dairy cattle are in a negative energy balance for a longer period compared with their lower producing counterparts (Fricke 2001). Twin pregnancies have a negative economic impact. Depending on the type of twin pregnancy, parity, and days in milk when the twin pregnancy occurs, the cost of the vet services per pregnancy increased from $97 to $225 per cow when compared with singletons. The overall negative economic impact of twinning on dairy farm profitability in the United States was estimated to be $96 million per year (Novales et al., 2018). Twinning poses a negative economic impact when compared with singleton calves. The dairy industry must be prepared for the challenges that come along with twins, whether it be early termination of the pregnancy or better management of the cow during the pregnancy. Dairy producers can help their cows throughout the pregnancy by giving moving cows to the transition group 3 weeks earlier and monitoring and maintaining the body condition score of the cow during the dry period (Fricke, 2001). Producers can achieve this by monitoring the ration of the group of cows and feeding them the appropriate ration for their stage in lactation.

Key Words: twinnings, high production, twin

41 Evaluating the potential impact of a slick gene on reducing heat stress in dairy cattle. M. Hillis* and J. Bohlen, University of Georgia, Athens, GA.

Heat stress is a major challenge to many dairy farmers, especially those in the southeastern United States where months of high temperature in conjunction with high humidity wreak havoc on productivity. The detrimental impact is seen most commonly in youngstock performance, reproductive efficiency, and output in the milking parlor. Estimates for yearly economic loss due to heat stress on dairies range widely, with the low end estimating a total loss of $900 million to the high end putting that estimate at just over $5 billion. Producers have long strategized on facility modifications to maximize heat abatement. Others have found advantages in simple alteration in herd makeup through crossbreeding. However, a new and finally tangible approach may be to further change the animal’s genetic makeup through specific gene selection. Cows with the “slick” gene, first identified in Senepol cattle, display a very short, slick coat. This slick coat is controlled by a single dominant gene located on bovine chromosome 20, which contains the prolactin receptor. Cows displaying the slick phenotype have a truncated prolactin receptor, caused by a single base deletion and an accompanying frame shift that results in an earlier stop codon on the prolactin receptor. Slick coated cattle are shown to have lower vaginal temperatures, lower respiration rates, and higher rates of sweat production. Most importantly to a producer’s bottom line, slick coated cattle experience a less dramatic drop in production during the warmer months. Two heterozygous registered Holstein bulls are currently being marketed to producers to introduce the phenotype into US herds. There is no evidence to suggest that the gene exists naturally in the base female Holstein population, so calves produced from the heterozygous bulls have a 50% chance of displaying the slick phenotype. As the breeding program continues, it is anticipated that homozygous bulls and females will quickly develop allowing producers to have a cow that, along with facilities, can maximize heat abatement and hopefully the producer’s financial profit potential.

Key Words: slick gene, heat tolerance, productivity

42 Balancing production and rumen health: Implementing precision technologies to manage subacute rumen acidosis. B. M. Winslow* and D. R. Olver, Pennsylvania State University, University Park, PA.

A wide variety of metabolic diseases cause economic loss in the dairy industry. Even well-managed, high-yielding herds are subject to metabolic diseases because of high dry matter intake and high grain content in lactation diets. Though concentrate feeding is known to increase milk production, high grain intake levels may cause a decrease in rumen pH, an imbalance of rumination, and a decrease in milk fat (Dohme, 2008;
Beauchemin, 2018; Harvatine, 2016). Abundantly feeding concentrates can result in rapid increases of volatile fatty acid (VFA) production. This in turn can lead to subacute rumen acidosis (SARA). SARA is characterized by bouts when ruminal pH drops between 5.2 and 5.6 for at least 3 h, over a 24 h period (Gozho, 2005). To prevent the onset of SARA and other associated conditions, efforts have been made to improve rumen environment using precision feeding technologies. The term “precision feeding” is used to describe efforts in ration formulation to manage nutritional requirements of dairy cows in specific life stages. Many researchers are developing nutritional management strategies that can be used to decrease the incidence of SARA. For example, the inclusion of physically effective fiber has been shown to maintain rumen pH by limiting the fermentation rates of non-fiber carbohydrates (Allen, 1997). Likewise, adding rumen modifiers and buffers in lactating diets can help maintain rumen pH, increase feed efficiency, and limit SARA (Krause, 2008). A recent advancement proven to be effective in limiting metabolic disorders such as SARA is the dynamic concentrate parlor feeder (DCPF). This conglomerate feeding technology is capable of calculating the nutrient needs of individual cows and supplementing ingredients with a focus on enrichment of TMR diets (Bach, 2014). Further development of precision feeding technologies can allow for reduced occurrences of metabolic disease, increased feed efficiency, and increased milk production.

Key Words: precision dairy technology, rumen health, subacute rumen acidosis

43 Probiotic supplements as a low-cost solution to bolster calf performance. K. Ciaston*, K. Daniels, and D. Winston, Virginia Tech, Blacksburg, VA.

Dairy calves are born with sterile gastrointestinal tracts (Uyeno et al., 2015). Microflora ingested during the birth process are the first colonizers of the calf gastrointestinal tract (GIT). Thereafter, bacteria from the calf’s environment are ingested. Ingested bacteria can be one of 2 types: pathogenic or commensal. In dairy calves, pathogenic bacteria cause illness and diminish efficiency of digestion and overall growth. Commensal bacteria, on the other hand, pose no such problem and often have favorable outcomes on calf growth. Probiotics are living organisms that, when consumed, maintain or restore beneficial bacteria to the digestive tract. Strains from the Lactobacillus, Enterococcus, and Bifidobacterium genera have been used efficaciously as probiotics in dairy calves (Uyeno et al., 2015). Times where probiotics may be especially beneficial to dairy calves include after a course of antibiotics during heat stress (Ruppert et al., 1998) and during the weeks surrounding weaning. Calves that consume probiotics tend to consume higher amounts of milk, grain, and forage earlier than non-treated calves, resulting in higher average daily gains (Quigley et al., 2014). Probiotics can be purchased over the counter at feed stores and anywhere that sells veterinary medicine. They are available in many forms to make administration easier. When used as a preventative, probiotics are an affordable first line of defense for dairy calves.

Key Words: calf, probiotics, immunocompetency

44 Salmonella Heidelberg in dairy calves. J. Pittman* and C. Williams, Louisiana State University, Baton Rouge, LA.

The most sensitive period in raising dairy calves is from birth to 3 mo of age. The most prevalent causes of morbidity and mortality from birth to weaning are scours and pneumonia, with 75% of calf deaths occurring due to these illnesses. Scours, or diarrhea, is a common illness in young dairy calves, accounting for approximately 50 to 75% of calf death during the first 3 weeks of life. The most common causes of calf scours are bacteria, viruses, and protozoa. Treatment of scours requires identification of the causative organism so that the proper intervention plan can be selected. It is important to note that many organisms that cause scours are zoonotic, so individuals caring for these animals must be extremely conscientious. Antibiotics are most useful when bacteria are the causative agent. Salmonella Heidelberg is a bacterium that causes severe illness in calves and humans. Calves infected with Salmonella Heidelberg may develop diarrhea or die abruptly without any clinical signs. People can also become infected with Salmonella Heidelberg with symptoms including diarrhea, fever, and abdominal cramps, which may last 4 to 7 d. From January 2015 through November 2017, a multi-drug-resistant Salmonella Heidelberg was linked to contact with dairy calves. A total of 56 people in 15 states were infected with this organism. Surveillance in veterinary diagnostic laboratories showed that calves in several states were infected with the outbreak strains of multidrug-resistant Salmonella Heidelberg, and a CDC investigation showed that the clinical isolates from affected individuals were resistant to multiple antibiotics. Currently, no approved antimicrobial drugs are effective against the Salmonella Heidelberg strains isolated from calves. Since periodic occurrence of Salmonella Heidelberg continues to be of concern, proper sanitation and hygiene are of utmost importance in preventing scours in calves and protecting human health.

Key Words: dairy calf, Salmonella, human health