

Public Abstract

First Name:Reagan

Middle Name:Janeen

Last Name:Bluel

Adviser's First Name:James

Adviser's Last Name:Spain

Co-Adviser's First Name:

Co-Adviser's Last Name:

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Title:THE EFFECTS OF SUPPLEMENTAL ANIONIC SALTS AND YEAST CULTURE ON THE PRODUCTION OF DAIRY CATTLE DURING THE PERIPARTURIENT PERIOD

The objective of this thesis was to determine nutritional strategies with the strategic use of feed additives during the periparturient period to reduce the negative energy balance of the transitioning dairy cow. Two research trials were conducted to evaluate the effect of a sulfur-based anionic salt fed during late gestation and yeast culture fed during the periparturient period on mineral and energy metabolism, intake, health, and production of Holsteins.

To evaluate the success of anionic salts in mineral and energy metabolism twenty-six mature cows were pair by expected calving date, lactation number, milk production potential, and body weight. Cows within pair were then randomly assigned to one of two diets. The dietary treatments were control (C) and supplemental anionic salt (A). Cows were fed the experimental diets as TMR via electronic feeding gates. Control diet was formulated to achieve a Dietary Cation-Anion Difference (DCAD) of +20 mEq/100 g dry matter. Control diet was predicted to provide 70g of calcium per cow per day. The treatment group was fed 454g per cow per day of a commercially formulated anionic salt supplement which lowered the DCAD level to -10 mEq/100 g dry matter. Treatment diets were formulated to provide a daily intake of 150g of calcium per cow per day. Diets were fed 30 days prior to expected day of calving. At calving, cows were fed standard lactation TMR for the first 6 weeks of lactation. Feed intake was measured daily. Urine pH was monitored twice each week using an electronic pH meter. Blood samples were collected weekly prepartum as well as on day -3 and day of calving. Postpartum blood samples were collected on day 1, 3, 7, 10 and 14 of lactation and then weekly until day 42. Blood samples were analyzed for Ca and NEFA. Daily milk yields and weekly milk component data were also collected. These data were analyzed for significance using SAS proc mix method.

Sulfur based anionic salts when fed during late gestation results in improved calcium metabolism. This is a result of mild metabolic acidosis that was observed through a significant decline in urine pH, increase in blood chloride, and decreased blood CO₂. Body weight and body condition score was not affected by treatment, however serum nonesterified fatty acids were lowered for cows fed anionic salt. This suggests the cows fed anionic salts were in a less negative energy balance through the transition period. This concept was further supported with the elevated dry matter intake observed during the first three weeks of lactation. Milk production, four percent fat corrected milk, milk fat, and milk protein were not affected by the addition of anionic salts during gestation. However milk urea nitrogen and the more sensitive measurement of postpartum blood urea nitrogen did differ between treatments with anionic salt cows producing elevated urea nitrogen concentrations. The improvement during the transition from gestation to lactation seen as the result of feeding anionic salts prepartum is likely a result of improved liver function. This concept was supported with control cows exhibiting elevated alkaline phosphatase and bilirubin concentrations during early lactation.

To evaluate the success of yeast culture energy metabolism ninety-five pregnant Holstein cows were fed one of three treatments from thirty days prepartum through day 77 post-partum. Dietary treatments consisted of: 1) no supplemental yeast culture (Control, C), 2) 56g of yeast culture (YC), or 3) 14g of concentrated yeast culture (CYC). Individual feed intake and milk production were measured daily. Body weight and body condition score were recorded weekly. Metabolic status was measured by analysis of blood samples collected sequentially throughout the study.

Yeast culture treatment did not affect DMI prepartum. Body weight and change in body weight were similar

among treatments during late gestation and early lactation. Cows fed CYC had a decrease in body condition score after calving that differed ($P = 0.03$) from cows fed the control diet. Yeast culture resulted in a significant quadratic response ($P < 0.002$) in DMI as a percent of body weight after calving, with a concurrent quadratic increase in 4% FCM compared to control. These results suggest that cows supplemented with yeast culture experienced improved rumen function during transition leading to increased feed intake, milk fat percentage and FCM yield during early lactation.