ADSA-SAD Original Research Undergraduate Competition

158 Assessment of ruminal fermentation characteristics under normal or high fermentative temperature in continuous cultures. C. C. King*[1], C. M. Dschaak[1], J.-S. Eun[1], V. Fellner[2], and A. J. Young[1], *[1]Department of Animal, Dairy, and Veterinary Sciences, Utah State University, Logan, [2]Department of Animal Science, North Carolina State University, Raleigh.*

A dual-flow continuous culture system was used to investigate effects of ruminal temperature and forage-to-concentrate (FC) ratio in lactation dairy diets on ruminal fermentation. The experiment was a 4 × 4 Latin square design with a 2 × 2 factorial arrangement of treatments (n = 4). Diets based on alfalfa hay and corn silage as forage sources were formulated to maintain different FC ratios (60:40 or 40:60, DM basis) in the high forage (HF) or the low forage (LF) diet, respectively. Four treatments were tested: HF under normal ruminal temperature (NRT; 39°C), LF under NRT, HF under high ruminal temperature (HRT; 41°C), and LF under HRT. Each independent run lasted 10 d (7 d of treatment adaptation and 3 d of data collection). The temperature of the HRT treatment was chosen to mimic ruminal fermentative environment when cows are under heat stress. Increasing ruminal temperature increased ($P < 0.01$) culture pH from 5.73 to 5.82 on average, but decreasing forage proportion in the diets decreased ($P < 0.01$) culture pH regardless of ruminal temperature. Total VFA concentration decreased ($P = 0.05$) in the HRT compared with the NRT, however, ruminal temperature did not affect molar proportion of VFA. Digestibilities of DM and NDF were not affected by ruminal temperature, whereas the HRT tended to decrease ($P = 0.14$) OM digestibility compared with the NRT (66.6 vs. 67.4%). The HRT increased ($P < 0.01$) methane production (mmol/d and mmol/g NDF digested) and ammonia-N concentration and flow. The HRT treatment also increased the concentration of C18:0, but decreased that of the C18:1 trans-11. Overall results suggest that during HRT as experienced by cows under heat stress nutrient digestion, energy utilization, and microbial protein synthesis are altered.

Key words: ruminal temperature, microbial fermentation, continuous culture

159 Supplemental butyrate does not enhance selective permeability of ruminal epithelia in sheep. D. J. Wilson*, T. Mutsvangwa, and G. B. Penner, *University of Saskatchewan, Saskatoon, SK, Canada.*

The aim of this study was to determine if increasing the intra-ruminal butyrate concentration would improve the selective permeability of ruminal epithelia. Suffolk wether lambs (n = 18) fed a common diet were randomly assigned to 1 of 3 in vivo butyrate supplementation levels: 0% (CON); 1.25%; and 2.50% butyrate as a proportion of DMI. After a 14-d feeding period, lambs were killed and ruminal epithelia from the ventral sac was prepared for mounting in Ussing chambers with separate mucosal (pH 6.2) and serosal (pH 7.4) buffer solutions. 1-^{14}C butyrate and D-1-^{3}H mannitol (both 74 kBq/10 mL) were added to the mucosal side and used to measure mucosal to serosal flux (J_{ms}) over 2 60-min flux periods with simultaneous measurement of transepithelial conductance (G_t). For the first (challenge) flux period, the mucosal buffer solution was either acidified to pH 5.2 (ACID) or used as a control (pH 6.2; SHAM). Buffer solutions were replaced for the second flux period (recovery). In vitro data were analyzed as a split-plot design with in vivo treatment as the main-plot, in vitro treatment as the sub-plot, and flux period as a repeated measure. Ruminal VFA was higher ($P < 0.001$) in lambs fed 2.50% compared with CON or 1.25% (31.3, 36.2, and 52.4 mM, respectively). Feeding supplemental butyrate increased ($P = 0.001$) ruminal butyrate by 6.3 and 20.8 mM for lambs fed 1.25% and 2.50% compared with CON (butyrate = 5.6 mM). The $J_{ms\text{-}butyrate}$ was lower ($P = 0.013$) for lambs fed 1.25% and 2.50% butyrate (3.00 and 3.12 μmol/(cm^2 × h), respectively) than CON (3.91 μmol/(cm^2 × h)). However, no differences ($P = 0.33$) were observed for $J_{ms\text{-}mannitol}$ and G_t with average values of 0.30 nmol/(cm^2 × h) and 3.99 mS/cm^2. There was an in vitro treatment × flux period interaction ($P = 0.003$) for $J_{ms\text{-}butyrate}$, where $J_{ms\text{-}butyrate}$ was not different during the challenge period for ACID and SHAM (3.84 vs 3.39 μmol/(cm^2 × h)), but $J_{ms\text{-}butyrate}$ was lower for ACID relative to SHAM (2.70 vs. 3.44 μmol/(cm^2 × h)) during the recovery period. These results indicate that increasing intraruminal butyrate concentration does not enhance the selective permeability of ruminal epithelia.

Key words: butyrate, ruminal epithelia

160 Effect of feeding a C16:0-enriched fat supplement on milk fatty acid composition. K. E. DeLand*, C. L. Preseault, M. S. Allen, and A. L. Lock, *Michigan State University, East Lansing.*

Dietary C16:0 has been reported to increase milk fat (MF) concentration and yield. This study evaluated the effect of a dietary C16:0-enriched fat supplement on the fatty acid (FA) composition of MF, in particular saturated FA (SFA) composition and concentration, in a crossover experiment with 21 d periods. The hypothesis was that an increase in MF yield would be due to an increase in C16:0 incorporation into MF, which would increase the MF concentration of SFA. Sixteen midlactation Holstein cows (249 ± 33 DIM) were assigned to treatment sequence; treatments were a C16:0-enriched (~85% C16:0) fat supplement (FAT, 2% DM) or a control diet (CON) containing no supplemental fat. Milk samples were collected on d 18 to 21 of each period. FAT increased MF concentration and yield by 7.6 and 8.1%, respectively ($P < 0.001$). This was due to a 26% increase in FA yield (mmol/d) of C16 FA (C16:0 + C16:1 cis-9, $P < 0.001$); the yield of de novo (<C16) and preformed (>C16) FA were not different between treatments (both $P > 0.25$). On a concentration basis, the FA profile (g/100 g FA) of MF for CON and FAT was 26.8 and 23.4 < C16 FA, 36.7 and 43.5 C16 FA, and 36.5 and 33.1 > C16 FA, respectively (all $P < 0.001$). The C16:0 concentration of MF increased 19% (35.4 to 42.1 g/100 g FA, CON vs. FAT, $P < 0.001$). This only resulted in a 3% increase in total SFA (70.2 to 72.1 g/100 g FA, CON vs. FAT, $P < 0.01$) because concentrations of SFA from C6:0 to C14:0 were reduced (all $P < 0.01$). There was a reduction in MF cis polyunsaturated FA concentration (2.8 to 2.5 g/100 g FA, CON vs. FAT, $P < 0.01$), and a trend for a reduction in total cis monounsaturated FA concentration (22.8 to 21.8 g/100 g FA, CON vs. FAT, $P = 0.08$). Total trans C18:1 concentration and yield was lower with FAT (17 and 10%, respectively, $P < 0.05$), with lower concentrations of all major trans C18:1 isomers ($P < 0.01$). Results demonstrate that although FAT increased the concentration and yield of C16:0, changes in other FA resulted in minimal differences in the concentration of total SFA in MF. Overall, the FA profiles of MF from CON and FAT were within recently published survey values for currently available dairy products.

Key words: milk fatty acids, palmitic acid, saturated fat

161 Impact of water intake on dairy cattle reticulorumen temperature. M. Cornett*, D. Ray, and J. Bewley, *University of Kentucky.*

Concerns remain about the effect of water intake on temperatures collected within the reticulorumen. The dramatic drop in reticulorumen temperature (RT) following water intake has been well documented; however, the time required for RT to return to pre-drinking baseline temperature (BT) has not been quantified. The objective of this study was to quantify the relationship between water intake quantity and BT. Four mid-lactation, multiparous, Holstein-Friesian dairy cows were equipped with SmartBolus transponders (TenXSys, Eagle, ID) set to record RT at 2-min intervals. Cows were housed in a tie-stall barn at the University of Kentucky Coldstream Dairy Research Farm. A TMR ration was provided ad lib at 05:30 and 14:00. One Poly Water bowl (SMB MFG, Wallenstein, ON) equipped with a range water meter Recordall Badger Meter (Badger Meter, Milwaukee, WI) was assigned to each tie stall to assess water intake. Drinking behavior was monitored by 2 observers for 48 consecutive hours. The termination of a drinking bout was established when 30 min elapsed without another drink. Quantities consumed within each drinking bout were used for analysis. Mean (±SD) volume of water consumed per drinking event was 0.27 ± 0.31 L. Mean (±SD) temperature drop (TD) across all drinking events was 2.29 ± 1.82°C. Mean (±SD) RT at the beginning of the drinking event was 39.76 ± 0.49°C (n = 84), while mean water temperature (WT) 15 min before the drinking event was 3.63 ± 3.14°C. Mean (±SD) BT, identified in 50 drinking events (59.5% of total drinking bouts), was 57.75 ± 38.70 min. The BT was moderately correlated with pre-drinking RT (r = 0.57, $P < 0.01$), TD (r = 0.49, $P < 0.01$), and WT (r = −0.28, $P < 0.05$).The TD was moderately correlated with the pre-drinking RT (r = 0.57, $P < 0.01$), the amount of water consumed (r = 0.53, $P < 0.01$), and BT (r = 0.49, $P < 0.01$). Regression was performed with the GLM procedure of SAS (SAS, Cary, NC) to assess factors influencing BT ($r^2 = 0.36$). The quantity of water consumed ($P = 0.03$), and the RT before a drinking bout affected BT, while WT did not ($P = 0.92$).

Key words: temperature monitoring, reticular temperature, water intake

162 Genotype and breed trend influences on citric acid and coagulation times of raw milk. M. Looney*[1], A. Laubscher[1], J. Medrano[2], R. Jimenez-Flores[1], and G. Rincon[2], *[1]California Polytechnic State University, San Luis Obispo, [2]University of California, Davis, Davis.*

Citric acid or citrate in milk plays a very important role while processing milk to produce cheese or yogurt. The objective of this study was to determine if citric acid levels measured in milk was related to genetic variants of various genes identified in Holstein and Jersey cows and its effect on gel formation. We collected milk samples from both Holstein and Jersey cows from the Cal Poly Dairy Farm, San Luis Obispo. Citric acid levels, protein, fat, lactose, and minerals were measured using FTIR methods with the FOSS Milkoscan FT2 on each sample. Genotypes were obtained for the DGAT 1, β-LG, ACLy and ACO1 loci using polymerase chain reaction and an enzymatic digestion using primarily the MwoI restriction enzyme. This procedure distinguishes the A and G variants of DGAT 1, A and B variants of β-LG gene and several variants of the other genes. Results from Holstein and Jersey cows indicated that citric acid level, as a percentage, was higher for the Jersey than for the Holstein cows–0.18 and 0.14, respectively. Protein and percent fat were included as independent variables in the statistical model, the difference between Holstein and Jersey for citric acid level was then considered for the different loci variants. Our preliminary data indicates the differences due to gene variants. All the samples were tested for gel forming kinetics using the ReoRex system. These experiments show the influence that citrate levels have on gel formation induced by chymosin.

Key words: citrate, DGAT, gel formation

163 Effects of different flooring options in outside pens of hutches on dairy calf growth. K. A. Hoeing*[1], M. A. Laws[1], T. S. Dennis[1], M. M. Schutz[1], S. D. Eicher[2], and T. D. Nennich[1], *[1]Purdue University, West Lafayette, IN, [2]USDA-ARS, West Lafayette, IN.*

Growth rates of dairy calves may vary due to many different factors, including housing. The objective of this study was to determine if calf growth was affected by different flooring options in the outside pen area of a calf hutch. For this study, 33 hutches were blocked in groups of 3 by location and the outside pen area was randomly assigned to 1 of 3 treatments: soil and lime (CONTROL), solid black rubber mats (SOLID), and black rubber mats with 2.5 cm holes (HOLES). Thirty-three heifer calves in the study were assigned sequentially by birth date to the next available hutch. The study was conducted during the summer of 2010 at the Purdue Dairy Research and Education Center. Calves were fed according to standard protocols and received 2 L of milk replacer per day and ad libitum access to calf starter and water. Body weight, heart girth circumference, hip height (HH), wither height (WH), and body temperature (TEMP) were measured when the calves entered the study and every 2 wk until weaning or 8 wk of age. Calves were observed 2 times/wk to determine behavior, calf cleanliness, flooring cleanliness, and hutch bedding cleanliness. Flooring temperature was determined using infrared temperature guns. Data were analyzed with Proc Mixed of SAS using repeated measures. Two calves, on treatments SOLID and CONTROL, died for reasons unrelated to treatment and were removed from the study. At 8 wk of age, BW was greater ($P < 0.05$) for HOLES and CONTROL than for SOLID (72.5, 69.2, and 64.0 kg, respectively), and HH and WH were greater for HOLES ($P < 0.05$) than for CONTROL and SOLID. Heart girth circumference and TEMP were similar among treatments ($P > 0.20$). Mat temperatures were similar for SOLID and HOLES (46.5 and 46.0°C, respectively) and were greater ($P < 0.001$) than CONTROL (37.7°C). Calf and bedding cleanliness were similar among treatments, though flooring tended ($P < 0.10$) to be dryer for HOLES at the beginning and dirtier in the middle of the study. Flooring options in the outside pen of calf hutches affected calf BW, HH, and WH at weaning, with rubber mats with holes improving calf growth compared with a lime and soil mixture or solid mats.

Key words: dairy, calf, housing

164 Alterations in the rate of progesterone clearance induced by insulin-like growth factor-I in the mouse hepatocyte. C. L. Varela*, K. D. Baldock, W. G. Squire, and D. L. Smith, *Eastern New Mexico University, Portales.*

Circulating concentrations of progesterone are at least, a critical indicator of potential embryonic survival, or maybe more importantly, contribute directly to pregnancy retention. In our previous research, we have shown insulin reduces the clearance of progesterone; thus potentially increasing embryonic survival. Further, the reduction in progesterone clearance was due to an insulin-mediated reduction in the cytochrome P450 enzymes that catabolize progesterone. It has been shown Insulin-like growth factor-I (IGF-I), produced by the hepato-

cytes, has no receptors in the liver, however there are insulin receptors. Insulin-like growth factor-I has been shown to bind to insulin receptors but with a lower affinity than insulin binding to its own receptor. The objective of this experiment is to determine the effect of different concentrations of IGF-I on the rate of progesterone clearance by hepatocytes. To determine the rate of progesterone clearance in response to challenge with different concentrations of IGF-I, mouse hepatocytes (10^5 per well) were plated in 10, 12 well plates with 5 ng/ml of progesterone added to the culture medium. To calculate the fractional rate of decay for progesterone, media was harvested at 0, 1, 2, 3 and 4 h following the addition of treatment. Cells were cultured in the presence of IGF-I (0, 6.25, 12.5, 25, 50, 100, 200 and 400 ng/ml). The conditioned media concentrations of progesterone were determined by enzyme-linked immunosorbent assay. Progesterone clearance was increased ($P < 0.05$) with the addition of 12.5 ng/ml IGF-I compared with control. Furthermore, there was a greater increase ($P < 0.05$) in progesterone clearance in response to 25, 50, 100, and 200 ng/ml IGF-I compared with the control, 6.25, and, 400 ng/ml IGF-I. These results indicate that hepatocytes in the presence of increasing concentrations of IGF-I, increase progesterone clearance and consequently could potentially reduce embryonic survival.

Key words: insulin-like growth factor-I, progesterone, hepatocyte

165 The effects of protease enzymes and storage on the ensiling and nutritive value of corn silage. K. M. Young*, M. C. Der Bedrosian, J. M. Lim, A. P. T. P. Roth, S. A. Santos, and L. Kung Jr., *The University of Delaware.*

The objective of this study was to evaluate the effects of adding protease enzymes to chopped whole plant corn on silage fermentation and nutritive value after varying lengths of storage. Chopped and processed whole plant corn (Mycogen TMR2W726, Dow AgroScience, Indianapolis, IN) was harvested (36.3% DM) and ensiled without enzymes or treated with one of 2 different proteases (E85 or E86; AB Vista, Wiltshire, UK) at one times (1X) or one hundred times (100X) the manufacturer's recommended dosage. The enzymes were mixed with a phosphate buffer and applied to chopped forage while mixing. Replicated-treated piles of forage were prepared for each enzyme treatment. Four bags of forage were vacuumed and heat-sealed for each enzyme treatment and storage time and allowed to ensile at 23 ± 2°C for 45 and 150 d. The hypothesis was that in the silo, proteases would liberate starch and increase starch digestibility (Starch-D). The statistical analysis included the main effects of enzyme treatments, days of storage and their interactions. When compared with untreated silage, there was no effect of protease or length of storage (45 vs. 150 d) on pH, concentrations of CP, ADF, NDF, or starch. At 45 and 150 d, treatment with proteases did not affect NDF-D or the concentrations of lactic acid, acetic acid or ethanol when compared with untreated silage. Ammonia-N and soluble-N (% of CP) contents increased after ensiling compared with levels at harvest and were greater ($P < 0.01$) for the 100X enzyme doses when compared with untreated silage at both storage times (45 and 150 d). Starch-D (ruminal in vitro, 7 h) was 66.3% for freshly chopped corn plants. After 45 d of ensiling, treatment with E86 100X had greater ($P < 0.01$) starch-D (80.6%) than all other treatments except it was similar to E85 100X. After 150 d of ensiling, E85 1X (81.9%), E85 100X (82.9%) and E86 100X (88.6%) had greater ($P < 0.01$) starch-D than untreated silage (74.0%). Effects of the proteases on amino acid content and for longer periods of storage will be determined. The data obtained to date suggests that exogenous proteases could be used to improve in vitro ruminal starch-D in corn silages.

Key words: corn silage, protease

166 Differences in the rumen methanogen population exist between Jerseys and Holsteins. E. King*, R. Smith, and A.-D. Wright, *University of Vermont, Burlington.*

Holstein and Jersey breeds account for the vast majority of cows within the dairy industry. While the population of rumen methanogens has been sequenced and analyzed in the Holstein, to our knowledge, a direct comparison has not yet been done between Holsteins and Jerseys. The molecular diversity of rumen methanogens in Holstein and Jersey dairy cows were investigated using 16S rRNA gene libraries prepared from pooled PCR products from the rumens of 9 Holsteins and 10 Jersey cows from Vermont. A total of 365 clones were generated, 180 clones from the Holsteins and 185 clones from the Jerseys. Approximately 99% of all clones identified belonged to the genus *Methanobrevibacter*, with 43% of these clones closely related to *Methanobrevibacter ruminantium*. Based upon 98% sequence identity, these 365 clones were assigned to 55 different OTUs. Twenty OTUs (85% of the clones) were common in both breeds. However, the Holstein cows revealed 23 OTUs not found in the Jersey cows, and the Jersey cows revealed 12 OTUs not found in the Holsteins. Shannon index and Libshuff analysis indicate that significant differences exist between the composition ($P = 0.01$) and diversity ($P < 0.05$) of the methanogens recovered from the 16S rRNA gene libraries from these 2 dairy breeds. These results suggest that breed and differences in feed utilization efficiency may account for the different rumen methanogen populations from these 2 dairy breeds.

Key words: methanogens, *Methanobrevibacter*, dairy cows

167 The association of electrical conductivities and California Mastitis Tests on a robotic dairy farm. A. M. Brigham*[1], C. D. Dechow[1], and B. Carter[2], *[1]Pennsylvania State University, University Park, [2]Keseca Veterinary Clinic, Geneva, NY.*

With the introduction of robotic milking systems there is less daily handling of each cow and producers must rely on computer generated udder health reports. The objective of this study was to determine if measures of electrical conductivity (EC) could be used to define a more sensitive and specific report. Over the course of 4 weeks, 227 cows from one farm were evaluated with a California Mastitis Test (CMT) after being flagged by the herd's software system. The robotic system recorded EC separately for each quarter. A list of cows suspected of having mastitis was generated daily and included cows with EC deviations of greater than 21% from their baseline. Cows were also flagged if there was an abnormal milk color or extreme deviation in milk yield from the previous day. In total, 20% of cows on the automatically generated report had a negative CMT result and the false positives create an unnecessary management burden for the herd. The association of CMT scores with quarter EC and the ratio of a quarter's EC to the cow's lowest quarter EC, or inter-quartile ratio (IQR), was determined using the mixed procedure in SAS. Least-squares-means for cows with a negative CMT result were 70.1 and 1.04 for EC and IQR, respectively, which were significantly ($P < 0.0001$) lower than results for cows that were strong positives (95.3 for EC and 1.37 for IQR). Subsequent analysis indicated that IQR had higher sensitivity than EC, whereas EC and IQR were similar for specificity. Milk cultures were also conducted for 53 quarters with positive CMT, and bacteria were isolated for 64 percent of samples. Least squares means for IQR and EC were not higher for CMT positive quarters with a positive

bacteria culture than CMT positive quarters with a negative bacteria culture. Measures of EC are helpful in identifying cows with mastitis in robotic milking herds, but need further development to create more management friendly reports with higher sensitivities and specificities.

Key words: electrical conductivity, California Mastitis Test

168 Effects of shade on heat stress reduction in Holstein dairy calves. S. S. Thibeau*[1], L. B. Sage[1], C. C. Williams[2], B. F. Jenny[2], and A. H. Dolejsiova[2], *[1]Louisiana State University, Baton Rouge, [2]LSU AgCenter, Baton Rouge, LA.*

Heat stress, a particular concern to southern dairy producers, can cause a variety of homeostatic alterations that can inhibit optimal calf development and prohibit full production potential. Therefore the objective of this study was to determine the effect of shade on performance and metabolic indicators of heat stress in neonatal dairy calves. Sixteen (n = 16) neonatal Holstein heifers were assigned to either a non-shaded (NS) or shaded (SS) hutch for an 8 week period. Rectal temperatures, surface temperatures and respirations were measured at 0830 h and 1600 h 3 times per week. Average daily starter intake (ADI), water intake and fecal scores were measured twice daily. Body weight, hip and wither height were measured at birth and at wk 1, 2, 4, 6, and 8. Blood was collected at birth and then weekly for analysis of plasma urea nitrogen (PUN) and packed cell volume (PCV). As expected for a normal growing calf, ADI, body weight, hip height, and wither height increased ($P < 0.01$) with age while fecal scores decreased ($P < 0.05$) over time. However, there were no observable treatment effects ($P > 0.1$) on these parameters. Calves in NS hutches drank more ($P = 0.1$) water than shaded calves. Calves also drank more water ($P < 0.01$) as they aged. A treatment by time interaction ($P = 0.05$) was observed for rectal temperature, with afternoon measurements being higher in NS calves. A treatment by time interaction ($P < 0.01$) was also observed for surface temperature with lowest values in the SS calves in the morning. Likewise, there was a treatment by time interaction for respiration rates, with afternoon values for NS calves and morning values for SS calves being the highest. Surface temperature and respiration rates decreased ($P < 0.01$) as calves aged. There was no significant ($P > 0.1$) treatment effect on PUN, although PUN levels increased ($P < 0.05$) as calves aged. There was treatment by week interaction ($P < 0.05$) on PCV, with NS calves having greater values after wk 3. While differences were observed in physiological parameters, there were no improvements in performance of these calves with addition of shade as a management practice.

Key words: heat stress, shade, dairy calves

169 Xylose absorption in dairy calves supplemented with sodium butyrate in milk replacer. N. M. Larson*[1], S. I. Kehoe[1], S. Moreland[2], and D. Shields[3], *[1]University of Wisconsin-River Falls, River Falls, [2]Nutriad, Inc., Elgin, IL, [3]Merrick's, Inc., Union Center, WI.*

Sodium butyrate has been reported to enhance intestinal development in neonates during growth. The objective of this research was to evaluate whether sodium butyrate supplementation in milk replacer would enhance intestinal absorption in growing dairy calves thereby improving production and health parameters. Seventy 2 bull calves were fed 280 g/d DM of milk replacer twice daily and treatments consisted of no supplementation (C), 0.44% sodium butyrate supplementation (L) and 0.88% sodium butyrate supplementation (H; Nutriad, Inc.). Growth (body weight, withers height, hip height, and heart girth) and health parameters (fecal scores, treatments, milk refusals) were monitored and blood was obtained from half of the calves and analyzed for glucose, blood urea nitrogen (BUN), and creatinine. At wk 3, calves were dosed with xylose and blood was taken 4 h after dosing. Least squares means were analyzed using repeated measures of the mixed procedure of SAS 8.2 with week as a repeated effect. Growth measurements at arrival and blood measurements during wk 0 were used as covariates for growth and blood analyses. Plasma xylose concentrations were not significantly different between treatments (27.6, 24.2, and 17.19 mg/dl, for C, L, and H, respectively). There were no significant differences between treatments in glucose, BUN, and creatinine concentrations. Growth parameters were also not different however heart girth tended to be lower for H calves. Average daily gain was not different, however, feed efficiency was significantly lower for C calves (1.6, 0.96, 0.97 kg feed/kg gain, for C, L, and H, respectively). Health parameters were not different between treatments. The supplementation of sodium butyrate did not appear to enhance any growth, health or metabolic parameters in this model.

Key words: calves, sodium butyrate, intestinal health