

Graduate Student Competition: ADSA Southern Section

82 Production response to corn silage produced from normal, brown midrib, or waxy corn hybrids. J. S. Barlow*, J. K. Bernard, and N. A. Mullis, *The University of Georgia, Tifton.*

The starch in Waxy corn hybrids is 100% amylopectin which has been suggested to be more digestible than that of normal corn hybrids, but the production response to feeding silage produced from these hybrids has been inconsistent. In contrast, brown midrib (BMR) corn varieties have lower lignin concentrations and have been shown to support higher DMI and milk yield. The objective of this study was to evaluate the nutrient intake and milk production response of lactating dairy cows to diets based on corn silage produced from 3 different types of corn hybrids. Thirty-six multiparous and primiparous Holstein cows (77 DIM and 37.1 kg/d milk) were used in an 11 wk completely randomized design trial during the fall of 2009. Experimental diets contained 36.4% of the dietary DM from corn silage from either a normal (Agratech 1021), BMR (Mycogen F2F797), or Waxy (Master's Choice 590) hybrid. All cows were fed the diet containing normal corn silage during the first 2 wk of the trial before being assigned to one of 3 treatments for the following 9 wk. Data collected during the first 2 wk were used as a covariate in the statistical analysis. No difference ($P = 0.81$) was observed in DMI among treatments which averaged 22.6 kg/d. Milk yield was highest ($P = 0.03$) for cows fed BMR (37.6 kg/d) compared with Waxy (35.2 kg/d) but similar to control (36.2 kg/d). Milk fat percentage tended to be lower ($P = 0.10$) for cows fed control (3.28%) compared with BMR (3.60%) or Waxy (3.55%) corn silage. Milk protein percentage ($P = 0.07$) tended to be lower for cows fed normal (2.79%) compared with Waxy (2.89%) but similar to BMR (2.85%). No differences were observed in yield of milk components. Energy-corrected-milk (ECM) yield, dairy efficiency (ECM/DMI), and BW change did not differ among treatments. Results of this trial are consistent with previous reports in which cows fed diets based on corn silage produced from BMR hybrids have higher milk yield compared with other hybrids. Corn silage produced from the waxy hybrid supported similar yield of ECM because of higher milk components, but milk yield was not improved compared with the normal.

Key words: waxy corn silage, BMR corn silage, milk yield

83 Ruminal escape and intestinal digestibility of experimental ruminal protected lysine supplements. Z. Wu*, J. K. Bernard¹, R. B. Eggleston², and T. C. Jenkins³, ¹*University of Georgia, Tifton*, ²*University of Georgia, Athens*, ³*Clemson University, Clemson, SC.*

Recent research has focused on the development of LYS supplements that resist ruminal degradation but are digestible in the small intestine using various fat coatings. Hydrogenated fats are poorly digested in the small intestine, so inclusion of polyunsaturated fatty acids (PFA) such as oleic acid may improve digestibility in the small intestine. The objective of this study was to determine the effect of the addition of 2 or 4% PFA to a hydrogenated fat coating applied to an experimental supplement with 55 or 58% supplemental LYS on ruminal escape and intestinal absorption of LYS. Two lactating Holstein cows (103 DIM and 45.1 kg/d milk) previously fitted with ruminal and duodenal cannula were individually housed and fed a corn silage based ration. In situ and mobile bag techniques were utilized as outlined in NRC (2001) to evaluate the 4 test products. Twenty 10 × 20 cm nylon bags of each product (5 g each) were incubated for 16 h in each cow. After ruminal incubation, products were repackaged (0.8g) into 5 × 10 cm nylon bags (20 per test product), soaked in pepsin/HCl solution for 2 h

before inserting into the duodenum and subsequently collected in the feces. All samples were analyzed for DM, N, LYS and acid hydrolysis fat concentrations. The percentage of DM and fat escaping the rumen decreased ($P < 0.001$) as PFA increased from 2 to 4% or as the proportion of supplemental lysine increased. An interaction ($P < 0.01$) was observed between PFA and LYS proportion because of a greater reduction of N and LYS escaping ruminal fermentation and flowing to the small intestine for the product with 58% supplemental lysine and 4% PFA in comparison to the other products. No differences were observed in intestinal digestibility of DM, N, LYS, or fat or the amount of lysine digested in the small intestine. Results of this trial indicate that increasing the proportion of PFA in the coating applied to supplemental lysine increases ruminal degradation. The extent of the degradation increases as the proportion of lysine in the product increases.

Key words: rumen protected lysine, ruminal escape, intestinal digestibility

84 Effect of sample processing on in situ protein degradability of distillers grains. M. L. Drewery*¹, J. E. Sawyer¹, N. M. Kenney¹, W. E. Pinchak², and T. A. Wickersham¹, ¹*Texas A&M University, College Station*, ²*Texas AgriLife Research, Vernon.*

Precise measurements of nutrient availability are important when formulating rations. The high moisture content of wet distillers' grains (DG) creates challenges for nutrient analysis and sample processing. Therefore, our objective was to determine how sample processing affects measures of rate and extent of protein degradation in wet DG samples. Three ruminally cannulated steers were fed a ration (15% CP) containing 38.5% corn, 28% hay, and 28% dried DG. Samples of wet DG were divided and a portion was frozen at -20°C while the remainder was dried at 55°C in a forced-air oven for 96 h. Dried samples were ground to pass a 2-mm screen. Five g of each sample was placed in Dacron bags, pre-incubated in tepid water, placed in a weighted mesh polyester bag, and incubated in the rumen for 4, 6, 12, 24, 48 and 72 h. Samples were rinsed in cold water and dried at 60°C. Nitrogen content was determined. Protein was fractionated into A, B, and C fractions. Degradation rate of the B fraction was calculated as the slope of the natural log of N remaining against time. Rate of passage was set at 3%/h. The A fraction was greater ($P < 0.01$) for frozen (43.3%) than dried samples (24.0%). In contrast, the B fraction was less ($P < 0.01$) for frozen than dried samples 52.1 and 70.0%, respectively. The C fraction differed ($P = 0.01$) between frozen and dried; however, the magnitude of this difference was small 4.5 and 5.9%, respectively. Degradation rate of the B fraction was greater ($P < 0.01$) for frozen than dried samples 1.31 versus 1.86%/h, respectively. Accordingly, estimated degradability was observed to be greater ($P < 0.01$) for frozen than dry samples 59.4 and 51.1%, accordingly. These results suggest drying wet DG impacts the measures of protein degradability.

Key words: distillers grains, degradability, protein

85 Effects of heat stress and increased protein and energy fed in milk replacers on health parameters of neonatal Holstein bull calves. A. J. Krennek*¹, G. A. Holub¹, T. A. Tomaszewski¹, and C. C. Stanley², ¹*Texas A&M University, College Station*, ²*Land O Lakes Purina Feed, Amarillo, TX.*

The objectives were to evaluate if calves in non-heat stress environment (NHS) were healthier than calves in heat stress environment (HS) or if feeding increased protein and fat in milk replacer (HPMR; 1135 g/d, 28% CP, 20% fat) versus a conventional milk replacer (CMR; 454 g/d, 20% CP, 20% fat) diet affected the health status of calves in the 2 environments. Calves were fed 6 L of HPMR or 4 L of CMR per day. Holstein bull calves ($n = 52$) < 3 d of age were assigned to a 2 X 2 factorial trial based on initial BW, physical health score, and total serum protein levels. Half of each nutrition group was housed indoors with temperature control non-heat stress (NHS) or outside under a metal roof in heat stress (HS) environment. The study was conducted for 56 d from, June 19 to August 13, 2010. The average Thermal Heat Index (THI) was calculated for each day by averaging the 24 recorded temperatures and RH%. The 56 d average, low, and high range THI for the HS was 79, 67, and 86 respectively, while THI for the NHS was 69, 66, and 74 respectively. Fecal scores (FS) of 1 to 4 (1 = hard, firm, 2 = soft, firm, 3 = no form, and 4 = watery) were recorded d to monitor scouring. Calves with a FS of 4 were considered to have diarrhea requiring treatment. Respiration rates (RR) were recorded at 0600 (AM) and 1800 (PM) d to monitor respiratory challenges while rectal temperatures (RT) were also measured using a digital thermometer daily in AM and PM to monitor febrile events. If RT was greater than 39.2°C for NHS calves and 39.7°C for HS calves, they were treated for fever (FE). The calves in HS had a higher RT AM, RT PM, RR AM, and RR PM ($P = < 0.01$) than calves in NHS (38.87 vs. 38.77 \pm 0.02), (39.03 vs. 38.79 \pm 0.05), (35.79 vs. 32.77 \pm 0.3), and (55.73 vs. 38.58 \pm 0.6) respectively. The calves in NHS had a higher FE ($P = < 0.01$) than the HS calves (6.24 vs. 2.33 \pm 0.94). The HPMR calves had a higher FS ($P = < 0.01$) than the CMR calves (2.05 vs. 1.73 \pm 0.03). This indicates calves in HS were experiencing higher RT AM, RT PM, RR AM, and RR PM. Also, the increased amount of protein and energy fed to the HPMR treatment had higher FS.

Key words: calf, milk replacer, heat stress

86 Effects of resistant starch in milk replacer on health and performance of neonatal Holstein heifer calves. B. L. Fisher*, B. F. Jenny, C. C. Williams, C. F. Hutchison, A. H. Dolejsiova, and R. G. Morell, *LSU AgCenter, Baton Rouge, LA.*

Forty-two female Holstein calves were assigned to one of 3 treatments at d 2 of age to study the effects of adding resistant starch (RS) to the milk replacer on health and performance. Treatments were control (no RS), 4g RS, or 8g RS mixed into the reconstituted replacer. Calves were housed in individual calf hutches and fed milk replacer once daily until d 42 of age. An 18% crude protein calf starter and water were offered ad libitum beginning d 3 throughout the duration of the trial. Calves remained in their hutches until 56 d of age to determine immediate postweaning performance. Body weights were measured at birth and d 14, 28, 42, and 56 of age. Withers height (WH), hip height (HH), and hip width (HW) were measured on d 14, 28, 42 and 56 of age. Feed intake, body temperatures, and fecal scores were recorded once daily through d 56. On d 14, 28, 42, and 56, fecal samples were collected for analysis of pH and volatile fatty acids (VFA), and blood was collected for analysis of plasma urea nitrogen (PUN) and total protein (TP). PUN and TP did not differ ($P > 0.05$) and were within

normal ranges suggesting that there were no major metabolic problems. There was no effect ($P > 0.05$) of treatment on body weight, HH, HW, WH, or body temperatures. There was a treatment by week interaction ($P < 0.01$) and a week effect ($P < 0.01$) for grain intake, with all calves increasing intake throughout the duration of the study. There was a treatment by week interaction ($P < 0.01$) and a week effect ($P < 0.01$) for fecal scores, with calves having lower fecal scores at the end of the study compared with the beginning. Fecal pH increased as calves aged ($P < 0.01$). There was a treatment by week interaction ($P < 0.05$) with an effect of both week ($P < 0.01$) and treatment ($P < 0.05$) for propionate concentration in the feces. There was an effect of week ($P < 0.01$) for acetate and butyrate concentrations as well as on total VFA concentration in the feces. Overall, incorporation of RS in the milk replacer of neonatal dairy calves did not show any significant effects on growth or gut health of Holstein dairy calves.

Key words: dairy calves, resistant starch, milk replacer

87 Potential for estrus detection in dairy cattle using reticular temperature monitors. W. A. Smith*, W. J. Silvia, and J. M. Bewley, *University of Kentucky, Lexington.*

An experiment was designed to evaluate the utility of reticular (RT) and vaginal (VT) temperatures in predicting the time of ovulation in dairy cows. Lactating Holstein and crossbred ($n = 30$) cows were synchronized using an OVSYNCH protocol preceded by G6G. The first injection of prostaglandin F α (PGF) was administered 40 to 90 d postpartum. OVSYNCH was modified by omitting the last injection of GnRH. The RT and VT were monitored using SmartBoluses (TenXsys Inc., Eagle, ID) inserted at least 5 d before anticipated estrus. Boluses were placed in the reticulum according to the manufacturer. Boluses were fixed to CIDR devices lacking progesterone (Pfizer Animal Health, NY) and inserted into the vagina using the CIDR speculum. Beginning at 48 h after the PGF injection of OVSYNCH, jugular venous blood samples were collected at 2 h intervals for LH and rectal temperatures were measured. After each sampling, cows were observed for estrus behavior. Beginning 72 h after PGF, ultrasonography was performed every 4 h to determine time of ovulation. Intensive sampling was maintained for 60 h or until ovulation was confirmed. Venous blood samples were collected daily for progesterone as an indicator of ovulation. The time intervals from injection of the OVSYNCH PGF, onset of estrus, LH surge, peak rectal temperature, and first detected increase in RT and VT to ovulation were determined. The mean and standard deviation for each interval was calculated. Only 18 cows ovulated within the sampling time frame and were used in this analysis. The average intervals in hours (\pm SD) from injection of the OVSYNCH PGF, onset of estrus, LH surge, peak rectal temperature, first detected increase in RT and VT to ovulation were 93 \pm 11, 31 \pm 8, 24 \pm 6, 46 \pm 11, 47 \pm 31, 45 \pm 27, respectively. The most precise predictor of interval to ovulation was the LH surge. The variation associated with the interval estimates based on RT and VT was high and precludes their usefulness as reliable predictors of the time of ovulation. Supported by the KY Agr Expt Stn and Genex Cooperative, Inc., Shawano, WI.

Key words: temperature, estrus, ovulation