

Ruminant Nutrition: Beef Cattle

T271 Performance and carcass traits of bulls fed different levels of crude glycerin. J. R. R. Carvalho, M. M. Ladeira*, M. L. Chizzotti, T. M. Gonçalves, P. D. Teixeira, J. S. F. Hostalácio, P. T. Silva, and O. R. Machado Neto, *Federal University of Lavras, Lavras, MG, Brazil.*

The use of crude glycerin to partially replace corn in feedlot diets might be interesting if performance and carcass quality are unchanged. The aim of this study was to evaluate the performance and carcass traits of bulls finished in feedlot fed different levels of crude glycerin. Forty-four Red Norte bulls received the following levels of crude glycerin (83% glycerol): 0, 6, 12 and 18% of DM. The basal diet consisted of 30% of corn silage, 12% of soybean meal, 56% of ground corn grain and 2% of mineral mixture. Glycerin was added to partially replace corn and to achieve an isonitrogenous diet, corn gluten meal (21% CP) was used. The experiment lasted 112 d, with 28 d for adaptation. Animals were weighed at the beginning and at the end of the experiment to obtain the average daily gain (ADG). All animals were slaughtered after fasting for 16 h and hot carcass weight (HCW) was recorded. After 24 h of cooling at 4°C, there were measured cold carcass weight, subcutaneous fat thickness (SFT) and longissimus muscle area (LMA) between the 12nd and 13rd ribs. The experiment was conducted in a completely randomized design and data were analyzed using PROC GLM and PROC REG of SAS 9.1. The inclusion of glycerin in the diet did not affect ADG, HCW, LMA and SFT (Table 1). The dressing percentage (DP) increased linearly with glycerin inclusion, likely due to a higher energy intake. The level of 18% of crude glycerin in diet DM to finishing beef cattle does not compromise performance or carcass traits. Funded by Fapemig, CNPq, CAPES, and INCT-CA

Table 1. Performance and carcass traits of bulls fed different levels of crude glycerin

Item	Crude Glycerin level, DM basis				SEM	P-value
	0%	6%	12%	18%		
Slaughter weight, kg	513	522	527	516	14.9	0.90
ADG, kg	1.75	1.92	1.88	1.80	0.10	0.62
HCW, kg	284	289	299	291	9.21	0.71
CCW, kg	278	283	287	279	8.59	0.87
DP, % ^a	55.4	55.5	56.8	56.5	0.43	0.05
SFT, mm	3.18	3.27	3.18	3.19	0.43	0.99
LMA, cm ²	83.13	78.15	85.45	87.84	2.69	0.11

^aY = 55.34* + 0.078*X (*P < 0.05).

Key words: dressing percentage, glycerol, longissimus

T272 Effects of distillers grain supplementation on beef cow performance. M. J. Faulkner*¹, P. M. Walker¹, R. L. Atkinson², J. L. Veracini¹, L. A. Forster³, J. M. Carmack¹, and K. L. Jones², ¹*Illinois State University, Normal*, ²*Southern Illinois University, Carbon-dale*, ³*Archer Daniels Midland Co, Decatur, IL.*

The objective of this 3-yr study is to determine the optimum inclusion rate for wet corn distillers grains with solubles (DGS) in late gestation and early lactation beef cow diets and the effect of including higher dietary levels of DGS on dystocia, postpartum conception rate, and other measures of cow and calf performance. During yr. 2, 128 cows were blocked by parity (first parity vs. 2 or more parities) and stratified by BW, subject to variation in BCS, to 16 pens, equivalent to 8 cows/pen. Four diets were fed until completion of timed (AI). Control cows

(T1) were fed corn silage, shelled corn, and soybean meal based diets to meet NRC estimates. In treatment diets DGS replaced shelled corn, soybean meal, and a portion of the corn silage, resulting in DGS inclusion rates (DM basis) of 11.4% (T2), 39.2% (T3), and 54.4% (T4). Analyzed dietary values for CP intake were 10.0%, 10.6%, 14.8%, and 18.3%, for T1, T2, T3, and T4, respectively. Mean DMI were 6.2 ± 0.6, 5.5 ± 0.04, 7.3 ± 1.0, 7.7 ± 1.1 kg for T1, T2, T3 and T4, respectively. No differences (P > 0.05) between treatments were observed for AI conception, calf birth weight, and milk production. Calving ease scores were not significantly different (P = 0.27) but a numerical increase toward increased difficulty was shown for T4 compared with other treatments. Differences in calf BW at AI (P = 0.01), cow BW change (P = 0.001), and cow BCS change (P = 0.001) were observed where T1 = T2 < T3 = T4. Higher (P = 0.003) DMI were observed for T3 and T4 than for T1 and T2. These data suggest that cows fed 39% to 54% of their diet as DGS consumed more DM and had increased BW, BCS and calf BW than cows fed to meet NRC recommendations with either DGS or shelled corn and soybean meal.

Key words: distillers grains, beef cow performance

T273 Effect of a mixture of cinnamaldehyde, carvacrol and capsicum oleoresin on performance and rumen development of weaning calves. C. Oguey*¹, J. Trautwein², H. Hendrik Kuhrmann², G. Dusel², and D. Bravo¹, ¹*Pancosma, Geneva, Switzerland*, ²*University of Applied Sciences, Bingen, Germany.*

Weaning is a critical period for the calf as its diet changes from liquid to solid feeding. Plant extracts are known to optimize rumen function in ruminants and growth performance in ruminants and monogastrics. The objective was to test the effect of a blend of cinnamaldehyde, carvacrol and capsicum oleoresin (XT, XTRACT 6930 and XTRACT Instant Pancosma) on performance and rumen parameters of weaning calves. Forty suckling calves aged of 14 d (initial BW 45 kg) were randomly allocated to 2 treatments for 68 d: CT: standard milk replacer (MR) and concentrate feed (CF), and XT: MR + 250 ppm XT and CF + 100 ppm XT. Animals were restricted fed MR from d1 to 60, and ad libitum fed CF, hay and corn silage from d 1 to 68. Individual daily intakes of MR and CF, daily hay and silage intake per group, individual weekly BW and BWG and blood and rumen parameters at d 56 were recorded. Data were analyzed using the GLM procedure of SAS. For the whole weaning duration calves fed XT exhibited a concentrate intake greater by 26.4% (P < 0.01) compared to CT. XT increased BWG and final BW respectively by 8.11% (P = 0.14) and 3.8% (P = 0.097). From d 1 to 42, compared to CT, calves fed XT exhibited greater concentrate intake (90.89 vs. 174.03 g/animal daily, P = 0.015) and BWG (470.75 vs. 536.718 g/animal daily, P = 0.012). From d 43 to 68, XT tended to increase concentrate intake (+14.5%, P = 0.125), but did not affect BWG (P = 0.300). However, at d 56, animals fed XT tended to have greater blood leucocytes (+13.8%, P = 0.11), monocytes (+39.0%, P = 0.19) and basophiles (+60.0%, P = 0.13), suggesting that these calves were subject to an infection. XT did not affect ruminal concentrations of total VFA and acetate (P > 0.76), but numerically increased ruminal concentrations of propionate and butyrate (respectively +10.3%, P = 0.64 and +39.0%, P = 0.15), suggesting that calves supplemented with XT can be more prone to a quick development of their rumen.

Key words: calf, essential oil, plant extracts

T274 Effect of fescue toxicosis on the expression of selected hepatic genes in Angus cattle. J. Bryant*, J. Johnson, B. Scharf, D. Kishore, E. Coate, P. A. Eichen, K. Wells, J. Green, and D. E. Spiers, *University of Missouri-Columbia, Columbia.*

Fescue toxicosis may result from intake of ergot alkaloids found in endophyte-infected (E+) tall fescue. The liver is the major organ involved in the pathology of fescue toxicosis, as it is the site where the toxic ergot alkaloids are metabolized. A study performed with rats consuming an E+ diet reported increased expression of phase I detoxification enzymes and a decreased expression of antioxidants, to suggest an increase of cellular oxidative stress. This study was performed to determine if intake of E+ fescue had the same effect on the expression of detoxification enzymes and antioxidants in cattle. Missouri- (MO; n = 10; 513.6 ± 13.6 kg BW) and Oklahoma- (OK; n = 10; 552.8 ± 12.0 kg BW) derived Angus steers, maintained at 19–22°C air temperature, were fed diets containing either endophyte-free (E-) or E+ seed (30 µg ergovaline/kg BW/day) for 8 d. Feed intake (FI) was recorded daily. Blood and liver tissue samples were collected during pretreatment followed by blood samples at d4 and liver tissue samples on d8 of treatment. A significant reduction (2.84 kg, $P < 0.05$) in FI of E+ steers occurred from treatment start to Day 7. Blood alkaline phosphatase was significantly lower in E+ steers compared with E- steers with a difference of 14.5 U/L ($P < 0.05$) to confirm the presence of fescue toxicosis. Real-time PCR was performed to determine expression of selected hepatic phase I detoxification enzymes and specific antioxidant proteins. Illumina deep sequencing was performed on samples from the fescue-naïve OK steers. Tiling of the sequences to a ~23,500 member reference allowed for the quantification of mRNA transcript abundance in each sample. Real-time PCR demonstrated that cattle consuming E+ fescue did not have a significant change in the expression of phase I detoxification enzymes or antioxidants. Illumina transcriptome analysis confirmed that E+ fescue did not have any significant effect on the expression of phase I genes; however, there were over 250 genes whose expression was significantly affected by E+ fescue, including several genes involved in lipid and carbohydrate metabolism and several involved in phase II conjugation reactions.

Key words: cattle, fescue

T275 Evaluation of Nellore steers' performance supplemented with two levels of concentrate and sugar cane in feedlot. R. M. Silva*^{1,2}, J. T. Pádua², J. Restle², R. Z. Taveira¹, B. A. S. R. Leite¹, and D. A. Lima², ¹Universidade Estadual de Goiás, São Luís de Montes Belos, Goiás, Brazil, ²Universidade Federal de Goiás, Goiânia, Goiás, Brazil, ³FAPEG, Goiânia, Goiás, Brazil.

The aim of this research was to evaluate the BW gain associated to the DMI of Nellore steers fed in feedlot. Two levels of concentrate, 40% and 60%, were used in the diets, which were composed by 36.71% and 59.45% of sugar cane, 27.08% and 53.74% of ground corn, 9.55% and 5.45% of cottonseed meal, 0.91% and 0.98% of urea, and 3.01% and 3.12% of a mineral mix, respectively. Twenty animal's with 24 mo of age and average weight of 347.60 kg were used. The animals were weighted every 21 d and on the last day of the trial, resulting in 90 d of trial. The mean intake of sugar cane was evaluated by weighing and collecting theorts twice a week. The mean results were compared by Tukey test ($P < 0.05$). The initial BW was not different among between ($P > 0.05$). There wasn't a difference in the ADG between the first and fourth weightings ($P > 0.05$). However, differences in ADG between the fourth and fifth weightings were detected ($P < 0.05$). The DMI wasn't different between the first and second weightings ($P > 0.05$).

Considering the final mean weight, the increase in the concentrate level from 40% to 60% did not result in significant weight gain.

Key words: average daily gain, beef cattle, nutrition

T276 The influence of glycerol supplementation during late gestation on beef cow performance and dietary digestibility. S. J. Winterholler*, N. L. Hojer, R. H. Pritchard, and K. VanderWal, *South Dakota State University, Brookings.*

Glycerol (GLY) was evaluated as an energy supplement for spring-calving beef cows during late gestation (n = 30; 637 kg of initial BW; 5.8 initial BCS) consuming medium-quality forage. Treatments were formulated to provide equal CP and included (DM basis): 1) 1.06 kg/d soybean meal (SBM); 2) 1.06 kg/d soybean meal and 0.86 kg/d glycerol (GLY); 3) 0.65 kg/d soybean meal and 1.74 kg/d soybean hulls (SBH). Glycerol and SBH were fed for isocaloric intake; SBM was the positive control. Glycerol was mixed with SBM daily and diets were fed individually. Cows had ad libitum access to medium-quality brome grass hay (7.6% CP%; 79% NDF, DM basis). Change in cow BW over the feeding period was similar among treatments (29 kg; $P = 0.20$). Change in BCS over the feeding period tended ($P = 0.12$) to be greater for GLY and SBH as compared with SBM (0.42, 0.15, -0.08, respectively). Cow BW (645 kg) and BCS (5.4) before breeding were similar among treatments ($P > 0.20$). Fecal grab samples were collected twice throughout the 60-d supplementation period and were composited to estimate dietary digestibility, using ADIA as an internal marker. Diet digestibility of DM (52.6%; $P = 0.64$), NDF (66.8%, $P = 0.82$), and ADF (68.3%, $P = 0.77$) were similar among treatments. Supplementation of GLY in a forage-based diet had no negative impacts on fiber digestibility. Additional energy from GLY was an effective replacement for SBH to maintain BCS during late gestation.

Key words: beef cow, glycerol, supplement

T277 The effect of feed additive and sulfur intake on rumen fluid pH and rumen gas cap hydrogen sulfide concentration in feedlot steers. K. L. Neuhold*¹, J. J. Wagner¹, T. E. Engle¹, E. M. Dobby¹, and M. Branine², ¹Colorado State University, Fort Collins, ²Alpharma Animal Health, Canon City, CO.

Crossbred yearling steers (n = 432) were used to study the effects of Cattlyst and Aureomycin (CA) vs. Rumensin and Tylan (RT) and variation in Sulfur (S) intake on rumen fluid pH and rumen gas hydrogen sulfide (H₂S) concentration. An unbalanced randomized block design using a 2 × 2 factorial was utilized. Factors included feed additive (CA vs. RT) and S concentration (constant vs. variable). The variable concentration (VAR) was intended to simulate the use of random loads of wet distillers grains (WDG). Random numbers were generated for each d of the study. High S diets (S = 0.60% of DM) were fed to VAR on d associated with an even number. Low S diets (S = 0.48% of DM) were fed to CON all d of the study and to the VAR only on d associated with an odd number. From d 0 through 35, a high S meal supplement was fed to VAR on the appropriate d. Since variation in S concentration in WDG is driven by rate of inclusion and S concentration in distillers solubles (DS), 2 DS based liquid supplements (low S, 0.99% vs. high S, 2.35%) were used to create the constant (CON) vs. VAR S intake from d 36 through slaughter. Sulfuric acid was added to the high S DS used to obtain the intended dietary S concentration. On d 35, 70, and 105 rumen fluid and gas cap samples were obtained via rumenocentesis from a subsample (3 hd/pen and 3 pens/treatment) of steers to determine rumen fluid pH and H₂S concentration. The effects

of feed additive, dietary S, or the interaction on rumen fluid pH were not significant ($P > 0.38$). An interaction between feed additive and dietary S treatment ($P < 0.02$) existed suggesting that the effect of feed additive on H₂S concentration was influenced by dietary S. Steers fed the CON diet receiving RT exhibited lower H₂S concentration than steers fed CA (1053 vs. 2519 mL/L). Steers fed the VAR diet receiving RT exhibited a higher H₂S concentration than steers fed CA (2567 vs. 2187 mL/L). Rumen H₂S concentration was related to rumen fluid pH suggesting that management of rumen pH is likely a key in dietary S management.

Key words: sulfur, ionophore, antibiotic

T278 The effect of feed additive program and dietary sulfur concentration in steam-flaked corn diets containing wet distillers grains on feedlot performance and carcass merit in yearling feedlot steers. E. M. Dombay¹, K. L. Neuhold¹, J. J. Wagner¹, T. E. Engle¹, and M. Branine², ¹Colorado State University, Fort Collins, ²Alpharma Animal Health, Canon City, CO.

Crossbred yearling steers ($n = 432$, $BW = 329 \pm 10.5$ kg) were used in an unbalanced randomized block design to examine the effect of feed additives and dietary sulfur (S) on performance and carcass merit. Treatment factors were arranged as a 2×2 factorial and included ionophore and antibiotic [Rumensin/Tylan (R/T) or Cattlyst/Aureomycin (C/A)] and dietary S (constant or variable). High S diets (0.60% S, DM basis) were fed on random days to the variable (VAR) treatment. Low S diets (0.48% S, DM basis) were fed to the VAR treatment on remaining days and to the constant (CON) treatment all days. From d0 to 35 the high S diet was achieved by using a high S meal supplement; however, since S concentration in wet distillers grains (WDG) is associated with distillers solubles (DS) added to WDG and H₂SO₄ added to the DS, the VAR S diets were achieved from d36 to d159 by using 2 DS sources at 0.99 versus 2.35% S. Cause of cattle death was verified by necropsy. No interaction between S and additive treatments existed for feedlot performance; therefore, only main effects are presented. Steers receiving VAR had higher ($P < 0.05$) BW compared with CON supplemented steers. Overall DMI was greater ($P < 0.05$) for VAR compared with CON steers. Average daily gain and feed efficiency were similar for CON and VAR. Steers receiving VAR diets had a higher mortality rate ($P < 0.02$) than steers fed CON diets (5.21 versus 0.67%). Feedlot performance and carcass merit were similar for feed additive treatments. The S by feed additive interaction was significant ($P < 0.05$) for dressing percentage indicating that S treatment had no effect on dressing percentage if R/T was fed but when steers were fed C/A, dressing percentage was reduced by 0.72% ($P < 0.02$) if VAR diets were fed. All other carcass characteristics were similar across S treatments. Results indicate that performance and carcass characteristics were not affected by feed additive program. Varying S in diets increased mortality rate; however, feedlot performance and carcass merit were not affected.

Key words: sulfur, ionophore, antibiotic

T279 Effects of dietary chromium propionate on performance traits of stocker/growing cattle. J. L. Veracini¹, P. M. Walker¹, M. J. Faulkner¹, and R. E. Hall², ¹Illinois State University, Normal, ²Cooperative Research Farms, Richmond, VA.

Chromium propionate is a trace mineral when in the +3 state will increase the uptake of glucose by insulin sensitive organs. How this change in glucose metabolism affects growth performance has varied depending on the dietary concentrations of Chromium and the differ-

ent substrates to which chromium is bound. The objective of this study was to determine if providing supplemental chromium to receiving calves in the feedlot improves growth performance and health status. Two hundred forty crossbred steer calves (260 ± 49 kg) were blocked by source and stratified within each block (3 blocks) by BW to 32 treatment pens (either 10 or 12 pens/block). All steers were fed a concentrate with or without chromium for 70 d, at 1.25% of BW along with forage ad libitum (ground grass hay for 55 d, followed by corn silage for 15 d). Two treatment concentrates containing either 0 (T1) or 717 ppb chromium (DM basis) from chromium propionate (T2) were randomly assigned to 16 pens each. Average chromium concentration in the total DM intake of steers on the chromium treatment was 328 ppb. There were no significant differences between treatments throughout the trial. Normal steer health status was maintained throughout the trial with the exception of d 14 to 28 when respiratory disease challenges were observed. Chromium supplementation (T1) tended to improve rate of gain 35% ($P = 0.074$) from d 14 to d 28 and 12% ($P = 0.058$) from d 0 to d 28. Feed efficiency tended to be improved 10% by chromium supplementation from d 0 to d 28 ($P = 0.106$). From d 28 to d 55, steers on the control diet (T2) exhibited some compensatory gain; which was nonsignificant. Steer performance subsequent to d 28 and for the overall 70 d trial was not ($P > 0.05$) influenced by chromium supplementation. The greatest advantage to chromium supplementation may occur during the receiving period when steers are subjected to respiratory disease challenges. During such periods ADG, and G/F may be improved up to 30% to 35%, respectively, for steers receiving supplemental chromium propionate compared with control steers.

Key words: chromium propionate, respiratory challenge, steers

T280 Nutrient digestibility and residual feed intake in Nellore heifers. R. H. Branco¹, E. Magnani¹, T. L. Sobrinho², S. F. M. Bonilha¹, L. T. Egawa¹, M. E. Z. Mercadante¹, and F. M. Monteiro¹, ¹Instituto de Zootecnia, Sertãozinho, São Paulo, Brasil, ²Faculdade de Ciências Agrárias e Veterinárias, Jaboticabal, São Paulo, Brasil.

Residual feed intake (RFI) as a tool for evaluating feed efficiency has been widely studied, however, associations among RFI, animal growth and nutrient digestibility are inadequate and existing data are contradictory. The objective of this study was to evaluate nutrient digestibility of Nellore heifers classified according to RFI. The experiment was conducted at Instituto de Zootecnia, Sertãozinho/São Paulo/Brazil with 32 Nellore heifers with 377 kg of average BW, previously classified according to RFI which was calculated by the difference between DMI observed and estimated by regression equation based on ADG and mid metabolic BW. Heifers were classified into high RFI ($\geq \text{mean} + 0.5$ SD; less efficient) and low RFI ($\leq \text{mean} - 0.5$ SD; more efficient). The diet was formulated with tifton hay, corn ground, cottonseed meal and urea, with 15.43% CP and 56.77% NDF. Animal feces were collected 2, 4 and 6 h after feeding, on consecutive 3 d, and analyzed for concentrations of DM, NDF, ADF, cellulose, ether extract (EE) and CP. Lignin was used as an internal marker. There were no differences between low and high RFI animals for CP digestibility (CPD; $P = 0.9506$) and EE digestibility (EED; $P = 0.6878$). Low RFI animals had higher DM digestibility (DMD), NDF digestibility (NDFD), ADF digestibility (ADFD) and cellulose digestibility (CELD) than the high RFI ones (Table 1). Differences in diet digestibility between RFI levels would be due to retention time and ruminal individual feeding behavior. Associations between RFI and nutrients digestibility, would indicate that the principle of equal digestibility for animals receiving similar diets would not be entirely accurate. Thus, it can be argued that small variations in nutrients digestibility provide great impact on

feed efficiency and may be a factor discriminating among levels of efficiency.

Table 1. Feed intake and nutrient digestibility of Nellore heifers classified for RFI

Traits	Low RFI	High RFI	CV	P-value
n	17	15		
RFI, kg/d	-0.419*	0.445	1.39E-4	<0.0001
DMI, kg/d	7.73*	8.43	10.4	0.0002
DMD, %	49.1*	45.4	10.5	0.0423
EED, %	54.5	57.1	32.6	0.6878
CPD, %	39.4	39.2	28.3	0.9506
ADFD, %	49.9*	45.1	11.5	0.0177
NDFD, %	56.6*	49.8	8.45	0.0002
CELD, %	61.6*	56.4	10.1	0.0203

Means followed by the symbol *, in the lines, differ significantly by t test at 5% of probability.

Key words: beef cattle, dry matter intake, efficiency

T281 Potential of calcium oxide-treated corn stover and modified distillers grains as a partial replacement for corn grain in feedlot diets. J. R. Russell¹, D. D. Loy¹, and M. Cecava², ¹Iowa State University, Ames, ²Archer Daniels Midland Company, Decatur, IL.

Effects of partial replacement of corn grain in the feedlot diets with calcium oxide (CaO)-treated corn crop residues and modified distillers grains with solubles (MDGS) were evaluated in sheep digestion and steer growth experiments. In 2009, corn stover (59.7% DM) was harvested and stored in silo bags untreated or treated with CaO at 5% of the DM. Large round bales of stover were also harvested, stored outdoors, and tub-ground before feeding. Baled stover was used as 5% of a Control diet containing corn grain, MDGS, and a mineral-vitamin supplement at 70, 20, and 5% of the DM. Three experimental diets containing 20, 35, 40, and 5% DM from baled (Baled diet), untreated (Untreated diet), or CaO-treated stover (CaO diet) with corn grain, MDGS, and mineral-vitamin supplements were also prepared. Baled, Untreated, and CaO-treated stover diets were fed at 1.5 × maintenance to 3 lambs (39 kg) in a 3 × 3 Latin-square digestion trial with 10-d adjustment and 5-d collection phases. Two hundred ten Angus-cross steers (294 kg) were allotted to 35 pens and fed the Control, Baled, Untreated, and CaO-treated stover diets to finish or fed the Baled, Untreated, and CaO-treated stover diets during growing to 454 kg and the Control diet to finish. The DM digestion coefficients ($P < 0.05$) were 75.9, 75.5, and 83.2% for the Baled, Untreated, and CaO-treated stover diets. Average daily gains (kg/d; $P < 0.05$) and feed-to-gain ratios (kg/kg; $P < 0.05$) of steers fed the Control, Baled, Untreated, or CaO-treated stover diets to finish and the Baled, Untreated, CaO-treated stover diets during growing and the Control diet to finish were 1.8, 5.5; 1.5, 6.2; 1.6, 5.8; 1.7, 5.2; 1.5, 5.8; 1.5, 5.5; and 1.6, 5.2 to finish. Steers fed the Control diet to finish had a higher ($P < 0.05$) marbling score than steers fed the stover diets. Economic returns per steers fed the CaO-treated stover diet to finish were greater than those fed the Control diet at a corn price of \$4.00/bushel and became more favorable with increasing corn prices.

Key words: beef steers, corn stover, modified distillers grains

T282 Performance of Nellore steers from a genetic improvement program in feedlot. M. D. Freitas Neto^{1,2}, J. J. R. Fernandes^{1,2}, D. A. Lima^{1,2}, P. L. P. Rezende^{1,2}, G. A. B. Queiroz¹, L. F. N. Souza³, J. M. C. Silva¹, E. G. Moraes³, and M. L. R. Pereira¹, ¹Universidade Federal De Goias, Goiania, Goias, Brasil, ²Conselho Nacional De Desenvolvimento Cientifico e Tecnologico, Brasilia, Distrito Federal, Brasil, ³Nelore Qualitas, Goiania, Goias, Brasil.

The objective of this trial was to evaluate the BW gain level of 113 Nellore non-castrated steers with an average age of 24 mo in feedlot. The animals were distributed into 16 pens, 15 pens with 7 steers and 1 pen with 8 steers, and divided into 4 treatments by grade of the genetic program: T1 = -0.067; T2 = 3.840; T3 = 7.049 and T4 = 10.763. The results were analyzed in a totally randomized design using the statistical software SAS (2002). The grade considers the BW at different ages and the scrotal circumference. The animals were fed once daily by a total mixed machine provided with a digital balance and the orts were weighed weekly. The diet was composed of 14.88% of sugar cane bagasse, 43.89% of corn germ, 4.36% of soybean meal, 19.15% of soybean hulls, 14.79% of cotton seed, 0.95% of urea and 1.99% of mineral. The animals were weighed before the beginning of the trial and then each 21 d. The animals with highest grade showed a higher DMI (kg/day) ($P < 0.05$), maybe because they had higher BW ($P < 0.05$). The treatments did not affect DMI (% of BW and BW^{0.75}; $P > 0.05$). The steers with higher grades (T4) showed higher ADG than the steers with lowest grade (T1). For T4, LM area was higher than the others ($P < 0.05$). There were no differences in rib fat thickness and rump fat thickness ($P > 0.05$). Correlations between the grade and DMI (kg/day), grade and ADG, grade and LM area and grade and rib fat thickness were ($r = 0.57$; $P < 0.05$), ($r = 0.66$; $P < 0.05$), ($r = 0.84$; $P < 0.05$) and ($r = 0.53$; $P < 0.05$), respectively.

Key words: carcass, fat thickness, longissimus muscle area

T283 Effect of partial or complete replacement of barley grain with wheat bran on voluntary intake, apparent nutrient digestibility and rumen pH of beef heifers fed backgrounding rations. A. D. Friedt¹, T. A. McAllister², and B. Wildeman³, ¹University of Saskatchewan, Saskatoon, SK, Canada, ²Agriculture and Agri-Food Canada, Lethbridge Research Centre, AB, Canada, ³Pound-Maker Adventures Ltd., Lanigan, SK, Canada.

Wheat bran (WB) is a high fiber, low starch by-product of the wheat processing industry. Few published studies are available on the nutritional value of WB for growing cattle. The objective of this trial was to evaluate the effect of replacing rolled barley (RB) with WB on apparent nutrient digestibility, voluntary intake and rumen pH of beef cattle fed a moderate energy growing diet. Five spayed and rumen cannulated Angus heifers (584 ± 40 kg) were used in a 5x5 Latin square design. The control diet consisted of 36% barley silage, 24% grass hay, 8% supplement and 32% RB (DM basis). Dietary treatments replaced RB with WB at 8, 16, 24 and 32% of the diet (DM basis). Voluntary DM intake was highest in the control ration and decreased ($P < 0.01$) as level of WB increased. Mean rumen pH, as well as duration (min) and area under pH cut off values of 6.0, 5.8 and 5.5 were not affected ($P > 0.05$) by WB inclusion. Maximum and minimum daily pH values were not affected ($P > 0.05$) by treatment. Feeding WB at levels greater than 8% of ration DM decreased ($P < 0.01$) DM and gross energy ($P < 0.05$) digestibility, while feeding WB at levels greater than 24% decreased ($P < 0.05$) organic matter digestibility. However, digestible energy content was not affected ($P > 0.05$) by WB treatment. Acid (ADF) and neutral (NDF) detergent fiber digestibility decreased ($P < 0.05$) in all

diets containing WB when compared with the control diet ($P < 0.05$) with the exception that NDF digestibility of the 24% wheat bran diet was similar to that of the control diet. Crude protein digestibility was not affected ($P > 0.05$) by treatment. These results indicate that due to reduced dry matter intake and apparent nutrient digestibility, WB is unlikely to support similar performance to barley grain in background-ing diets for cattle.

Key words: wheat bran, digestibility, beef heifers

T284 Effect of different doses of chitosans to modulate ruminal fermentation in Nelore steers. F. P. Renno^{*1,2}, A. P. C. Araujo¹, J. E. Freitas Junior², J. R. Gandra¹, R. Gardinal¹, G. D. Calomeni¹, L. N. Renno³, M. C. B. Santos¹, and R. T. Trimboli¹, ¹University of Sao Paulo, Sao Paulo, Sao Paulo, Brazil, ²State University Julio de Mesquita, Jaboticabal, Sao Paulo, Brazil, ³Vicosa Faculty of Life Sciences and Health, Vicosa, Minas Gerais, Brazil.

The objective of this study was to evaluate the inclusion of different doses of chitosan in the diet of beef cattle on intake and in the pattern of ruminal fermentation. Eight Nelore steers (540 ± 28.5 BW/kg of SD) cannulated in the rumen were used and divided into 2×4 balanced Latin squares with a experimental period of 21 d, being 14 d for adaptation and 7 d of sample collection. The daily doses of chitosan (0, 50, 100 and 150 mg/kg BW) were inserted directly through the rumen cannula, twice daily. Daily intake was measured individually so to be kept a percentage of orts between 5 and 10% of the total supplied in the previous day. Samples of ruminal fluid were collected at 0 (before feeding) and 2, 4, 6, 8, 10 and 12 h after feeding. For variables measured at long time, the statistic model included treatment (doses), the time and the interaction between time and treatment as fixed effects. There was no effect of doses on the DMI, pH and NH₃-N concentrations. There was linear effect for concentrations of propionate (mmol/L) with increasing doses of chitosan (21.40; 20.88; 21.66 and 22.08 for 0, 50, 100 and 150 mg/kg BW, respectively). There was linear effect for concentrations of acetate (mol/100mol) and decrease of relation C2/C3 with increasing doses of chitosan (69.17; 69.00; 68.67 and 67.97 for 0, 50, 100 and 150 mg/kg BW, respectively). Similarly there was a linear effect for concentrations of propionate (mol/100 mol of VFA) with increasing doses of chitosan (19.56; 19.57; 20.20 and 21.13 for 0, 50, 100 and 150 mg/kg BW, respectively). At the significance level of 5% the analysis in SAS 9.1 by Proc Mixed pointed as best dose for that occurs increase of the energy efficiency 150 mg/kg BW. The increase addition of chitosan in diets change the pattern of ruminal fermentation in Nelore steers.

Key words: energetic efficiency, intake, short chain fatty acids

T285 Evaluation of residual feed intake of Nelore bulls from a genetic improvement program. M. D. Freitas Neto^{1,2}, J. J. R. Fernandes^{*1,2}, D. A. Lima^{1,2}, P. L. P. Rezende¹, L. F. N. Souza³, E. G. Moraes³, R. A. Nogueira¹, and M. L. R. Pereira¹, ¹Universidade Federal de Goias, Goiania, Goias, Brasil, ²Conselho Nacional de Desenvolvimento Cientifico e Tecnologico, Brasilia, Distrito Federal, Brasil, ³Nelore Qualitas, Goiania, Goias, Brasil.

The goal of this trial was to evaluate the residual feed intake (RFI) relating to performance and carcass characteristics of 117 Nelore bulls from a genetic improvement program. The animals were an average of 24 mo of age and were located in individual pens. The production measures evaluated were: dry matter intake (Kg/day, %BW and g.BW^{-0.75}), average daily gain (Kg/day), feed efficiency (gain:feed), feed conver-

sion (feed:gain). For carcass characteristics, longissimus muscle area (LMA), rib fat thickness (RFT) and rump fat thickness (RUFT) were measured by ultrasound. Dry matter intake (Kg/day) was determined weighing the orts every day. The diet was composed by 5.92% of corn silage, 30.89% of sugar cane bagasse, 26.01% of corn germ 15.12% of soybean meal, 19.53% of soybean hulls, 0.94% of urea and 1.60% of mineral mix. The animals were weighed in the beginning of the trial and each 21 d, so the average daily gain (ADG) could be determined. The estimated dry matter intake (Kg/day) was calculated by the regression of dry matter intake (Kg/day), ADG and BW^{-0.75}. The residual feed intake (RFI) was obtained by the difference between the DMI and the EDMI. The bulls were divided in 3 treatments: low, middle and high RFI and the results were analyzed using the statistical software SAS (2002). The animals with low RFI showed less dry matter intake (%BW and g.BW^{-0.75}) ($P < 0.05$). A better rate of feed efficiency and feed conversion was showed by the animals with low RFI ($P < 0.05$), because of low dry matter intake. Any difference was found for LMA, RFT and RUFT measured by ultrasound ($P > 0.05$). There were no difference ($P > 0.05$) for first weight, final BW and final BW^{-0.75}, showing no relation between RFI with final weight and feed conversion. Correlations between RFI and feed conversion, dry matter intake (%BW) and RFI and dry matter intake (g/Kg g.BW^{-0.75}) and RFI were ($r = 0.27$; $P < 0.05$), ($r = 0.81$; $P < 0.05$) and ($r = 0.88$; $P < 0.05$), respectively. No significant correlation for carcass characteristics (LMA, RFT and RUFT) and RFI was found.

Key words: feed efficiency, fat thickness, average daily gain

T286 Effect of different doses of chitosans on ruminal microbial protein synthesis in Nelore steers. F. P. Renno^{*1}, A. P. C. Araujo¹, J. E. Freitas Junior², J. R. Gandra¹, G. D. Calomeni¹, R. Gardinal¹, L. N. Rennó³, B. C. Venturelli¹, T. H. A. Vendramini¹, and F. G. Vilela¹, ¹São Paulo University, São Paulo, São Paulo, Brazil, ²State University Julio de Mesquita, São Paulo, Jaboticabal, Brazil, ³Faculty of Life Sciences and Health, Facis, Viçosa, Minas Gerais, Brazil.

The addition of controllers of rumen fermentation in ruminant diets has been explored in last year aiming to increase energy efficiency and the animal performance. The objective of this study was to evaluate the inclusion of different doses of chitosan in the diet of beef cattle on ruminal microbial protein synthesis. Eight Nelore steers (540 ± 28.5 BW/kg of SD) cannulated in the rumen were used and divided into 2×4 balanced Latin squares with a experimental period of 21 d being 14 d for adaptation and 7 d of sample collection. The daily doses of chitosan (0, 50, 100 and 150 mg/kg BW) were inserted directly through the rumen cannula, twice a day. Urine samples were collected on d 16 of the experimental period. The estimation of microbial protein synthesis was performed by the method of total excretion of purine derivatives. There was no effect of doses evaluated on concentrations of microbial nitrogen and microbial protein to the 5% level of significance by SAS Proc Mixed 9.1. The values observed for microbial nitrogen were 53.31; 59.53; 48.75 and 79.55 g/day for the doses 0, 50, 100 and 150 mg/kg BW, respectively. The values of microbial crude protein observed were 352.02; 373.33; 302.85 and 448.48 g/day for the doses 0, 50, 100 and 150 mg/kg BW, respectively. The addition of different doses of chitosan did not influence ruminal microbial protein synthesis in Nelore steers.

Key words: microbial nitrogen, purine derivatives, chitosan, beef cattle

T287 Effect of crude glycerin on nutrient intakes and apparent digestibility in Nellore feedlot steers. E. H. C. B. van Cleef*, J. M. B. Ezequiel, A. C. Homem Júnior, A. P. D'Áurea, J. B. D. Sancanari, F. B. O. Scarpino, D. A. V. Silva, and V. R. Fávaro, *São Paulo State University, Jaboticabal, São Paulo, Brazil.*

Thirty Nellore steers (277.7 ± 23.8 kg BW) were used to compare effects of diets containing increasing levels of crude glycerin to a control on nutrient intake and apparent digestibility. Cattle were blocked by weight and assigned randomly to one of the 5 treatments during 103 d. Animal was the experimental unit, and model effects included block and treatment. Orthogonal contrasts were used to determine the linear, quadratic, and cubic effects of glycerin, and 0% glycerin vs glycerin treatment. Experimental diets consisted of 30% corn silage and 70% concentrate (corn grain, soybean hulls, sunflower meal, glycerin) and were labeled as: 1) diet with no added glycerin (CON), 2) 7.5% glycerin on diet dry matter basis (7.5GLY), 15% glycerin on diet dry matter basis (15GLY), 22.5% glycerin on diet dry matter basis (22.5GLY), 30% glycerin on diet dry matter basis (30GLY). Indigestible neutral detergent fiber was used as internal marker to determine nutrient apparent digestibility. Five ruminally cannulated Nellore steers were adapted to experimental diets and used to incubate diets, Orts and fecal samples from the 30 finishing study animals for 264 h. DM intake tended ($P = 0.09$) to decrease linearly with glycerin level. NDF and EE intakes decreased ($P < 0.01$) when glycerin was added to the diets. CP intake was not influenced ($P > 0.05$) by the inclusion of glycerin, and the ADF intake showed a quadratic effect ($P = 0.04$). Feeding glycerin caused linear ($P = 0.03$) reductions in NDF apparent digestibility while simultaneously increasing CP apparent digestibility. The DM, EE and ADF apparent digestibilities were not altered ($P > 0.05$) by glycerin. The inclusion of crude glycerin in feedlot cattle diets becomes a viable alternative since it provides no significant decrease in dry matter intake and digestibility of most nutrients in Nellore cattle. Caution should be taken to the level of roughage used, once the glycerin has a negative effect on fiber digestibility. Further studies are needed to elucidate the relative feed value of glycerin and its effects on performance, carcass characteristics and meat quality.

Key words: biodiesel, co-products, feedlot cattle

T288 Performance and carcass traits of bulls fed lipids sources and ionophore. L. C. Santarosa, M. M. Ladeira*, O. R. Machado Neto, M. L. Chizzotti, T. M. Gonçalves, D. M. Oliveira, L. S. Lopes, J. S. F. Hostalácio, and M. C. L. Alves, *Federal University of Lavras, Lavras, MG, Brazil.*

The objective of this research was to evaluate the performance and carcass traits of Red Norte bulls fed soybean ground grain or protected fat (calcium salts) based on soybean oil, and with or without the inclusion of the sodic monensin. Forty animals were allotted in a completely randomized design using a 2×2 factorial arrangement. The diets had corn silage as forage (40% of DM basis), and were isonitrogenous (12.7% CP), with the same ether extract content (7.2%), and neutral detergent fiber (29%). When the ionophore was supplemented, the dosage used was 230 ppm/day. The animals were weighed every 28 d after fasting for 16 h. The duration of the experiment was 84 d, preceded by 28 d of adaptation. At slaughter, carcasses were identified, weighed, washed, divided into halves, and stored in a cold chamber for 24 h at 1°C temperature. After 24 h were measured cold carcass weight, the subcutaneous fat thickness and *Longissimus* muscle area between the 12th and 13th ribs. There were no interaction between lipid source and ionophore ($P > 0.15$) and for lipid source ($P > 0.13$). There were no effects

of ionophore for most of the variables, except for dressing percentage (DP), which can be due to an improvement in the metabolizable energy content of the diet. It can be concluded that the ground soybean grain or protected fat did not affect the weight gain any of the carcass traits. Funded by Fapemig, CNPq, CAPES and INCT-CA

Key words: monensin, protected fat, soybean

T289 Effect of post-ruminal *Saccharomyces boulardii* on fecal parameters and nutrient digestibility in Holstein steers given abomasal oligofructose. K. Davison*, R. L. Hougantogler, C. Leonard, M. M. McCarthy, L. M. Nemecek, and T. F. Gressley, *University of Delaware, Newark.*

Dietary conditions that lead to increased carbohydrate fermentation in the large intestine of ruminants may damage gastrointestinal tissues. Probiotics such as *Saccharomyces boulardii* (SB) modify intestinal fermentation and may improve the response to a large intestinal carbohydrate load. This study evaluated the effects of SB on fecal parameters and nutrient digestibility in steers before and after an abomasal oligofructose challenge. Six ruminally cannulated Holstein steers were used in a crossover design experiment with 18 d periods. Treatments were abomasal delivery of 0 or 10 g/d SB. On d 16 of each period, steers were abomasally dosed with 0.25 g/kg BW oligofructose every 6 h for 24 h. Pre-challenge fecal samples were collected every 6 h for 24 h before the first dose, and post-challenge samples were collected every 6 h for 48 h following the first dose. Dry matter, pH, and organic acid concentrations were measured on each sample. Fecal samples were composited by day and used to quantify apparent total tract nutrient digestibility. For DM, pH, and organic acid data, pre- and post-challenge results were each statistically evaluated using a mixed model including fixed effects of treatment, hour, their interaction, sequence, and period, and the random effect of steer. Time was included as a repeated measure. For digestibility data, all results were analyzed in one model. Treatment did not affect pre-challenge fecal DM, pH, or organic acid concentrations ($P > 0.10$). Post-challenge, SB decreased total organic acid concentration (56 vs. 65 mM, $P = 0.05$) and tended to increase fecal pH (6.96 vs. 6.81, $P = 0.09$). Treatment did not affect digestibility of OM, starch, or CP, but there tended to be a treatment \times time interaction for NDF ($P = 0.07$). Pre-challenge, SB increased NDF digestibility (45.8 vs. 43.2%), but there was no difference during or following the challenge. The SB treatment modified hindgut fermentation as evidenced by decreased fecal pH and VFA changes following a fermentable carbohydrate challenge and by increased NDF digestibility pre-challenge.

Key words: feces, hindgut, yeast

T290 Can forage-based nutritional strategies offset weaning stress in calves? S. R. Blevins*, A. E. Tanner, W. S. Swecker, B. F. Tracy, D. A. Fiske, J. P. Fontenot, and R. M. Lewis, *Virginia Tech, Blacksburg.*

Weaning is stressful for calves. Calves often vocalize and pace rather than eat, resulting in weight loss and poor gains. Spring-born calves are typically weaned in late summer or early fall, where forages adequate for a mature animal may be insufficient for the maintenance and growth requirements of newly weaned calves. The purpose of this study was to determine if alternate forages could increase gains of newly weaned calves. The study was conducted at a research farm in western Virginia (latitude: 37°56' N; longitude: 79°13' W; elevation: 537m). After weaning, 24 moderate and 24 large framed Angus-cross

steer calves were assigned to 1 of 4 forage types: (i) nil-ergot, endophyte-infected fescue, (ii) endophyte-free fescue, (iii) orchardgrass + alfalfa, and (iv) orchardgrass + red and white clover. Three replicates of each forage type (1 ha area each) were grazed for 42 d by 4 calves (2 per frame size). Blood and fecal samples, and BW, were collected on d 0 and 42. Serum was analyzed for blood urea nitrogen, NEFA, glucose, and cortisol. Fecal samples were analyzed for cortisol. The experiment was repeated over 2 years. Data were analyzed (GenStat) using a split-plot design, with year and replicate fitted as random. Fixed effects were forage type, frame size, and their interaction. Age at weaning was a covariate. Between April and September paddocks received on average 59 cm of rain. An additional 8 cm fell during the experiment. Forage on offer did not differ between paddocks (748 (SD 131) kg/ha; $P > 0.10$), with no difference in CP (13 (SD 4) % DM basis) or NDF (33 (SD 4) % DM basis) between forage types ($P > 0.10$). As expected, large frame steers were heavier than medium frame steers ($P < 0.01$) at both the beginning and end. However, no differences were detected ($P > 0.05$) in ADG (0.48 (SD 0.22) kg/d) among forage types or frame sizes. Blood and fecal chemistry results also did not differ among treatments ($P > 0.05$). The forage types considered did not result in different ADG. The question remains whether other forages may be better suited to increasing post-weaning gains in fall-weaned calves in forage-based systems.

Key words: alternative forages, stress, weaning

T291 Urea supplements for beef steers grazing on marandugrass pastures during dry season in the Brazilian savannas. D. G. de Quadros^{*1}, H. N. de Souza², G. L. Franco³, R. G. de Almeida¹, and D. N. de Oliveira¹, ¹Universidade do Estado da Bahia (UNEB), Barreiras, Bahia, Brazil, ²PETROBRAS, Rio de Janeiro, Rio de Janeiro, Brazil, ³Universidade Federal do Mato Grosso do Sul (UFMS), Campo Grande, Mato Grosso do Sul, Brazil.

During the dry season in the Brazilian savannas, pastures become mature, lowering the nutritive value. The objective of this work was to evaluate urea supplements on the grazing behavior and performances of beef steers grazing marandugrass (*Brachiaria brizantha* 'Marandu') pastures. Twenty Nellore steers, weighting 300 ± 24.9 kg of initial liveweight, were used, 5 for treatment, grazing on 5 paddocks of 4 ha, rotating every 7 d, from July to October of 2010, in Barreiras, Bahia, Brazil. The supplements tested were: commercial mineral (M), mineral + urea (MU), and 3 multiple mixes (45.5% TDN) with corn, soybean meal, and 10 (MM10), 15 (MM 15), and 20 (MM20) % of urea, containing 0, 70, 41, 51, and 63% CP, respectively. Grazing behavior was observed every 14 d, registering every type of behavior (grazing, feeding supplements, ruminating/resting, others) during a 24h period. Dry matter and height of pasture were sampled monthly. Weekly, the intake of supplements was measured and the cattle were weighted every 28 d. The experiment was conducted using a completely random design, with 5 treatments and 4 replications. Data were submitted to ANOVA, using Tukey test to compare average values ($P \leq 0.05$). Dry matter was reduced by almost 50% compared from the beginning (7 ton) to the finishing time, mainly leaves, although the height just decreased 10 cm (from 61 to 51 cm). Supplementation reduced grazing time and simultaneously increased rumination/resting time. However, the patterns of behavior were not affected by supplementation. The daily intake of supplements changed with treatment, being 106, 196, 852, 666, and 400 g for M, MU, MM10, MM15, and MM20, respectively. The utilization of mineral alone (M) resulted in expressively less liveweight (150 g/day). Urea in the supplement (MU) maintained cattle liveweight. However, if gains are expected, the mixes should be

used. In these cases, liveweight gain reached 324 g/day. Comparing economic performance, the best treatment was MM20, followed by MM10. Urea supplements were shown to be an indispensable tool to beef cattle production.

Key words: multiple mix, performance, protein

T292 Influence of nonmedicated additives as alternatives to antibiotics on calf plasma and intestinal measurements. S. M. Katzman^{*1}, S. I. Kehoe¹, and D. B. Carlson², ¹University of Wisconsin-River Falls, River Falls, ²Milk Products LLC, Chilton, WI.

Many producers use medicated milk replacers to prevent scours in dairy calves, however, a commonly added level of neomycin and oxytetracycline is no longer approved. The objective of this trial was to determine whether a milk replacer with a blend of nonmedicated additives would have similar benefits to a milk replacer with added neomycin and oxytetracycline on intestinal function and electrolyte profiles. Twelve bull calves were purchased from a local farm 3 separate times and were fed 1 of 3 treatments for a 5-week period. All treatments used a 20% fat, 20% crude protein milk replacer with either no additives (C), a blend of nonmedicated additives (NM; animal plasma, yeast cell wall extracts, inulin, and a direct-fed microbial), or neomycin and oxytetracycline (MED; 400 g/ton of neomycin; 200 g/ton of oxytetracycline). Two calves from each treatment were slaughtered during their second day of scouring and intestinal tissues were collected for morphological analyses of jejunum. Plasma samples were obtained weekly and analyzed for sodium, chloride, potassium, calcium, bicarbonate, phosphorus, BUN: creatinine ratio, and anion gap. Proc Mixed in SAS 9.2 was used with a repeated week statement to analyze blood results and repeated calf statement to analyze intestinal results. Plasma results indicate no significant differences between treatments except for sodium concentrations which were significantly lower for C calves (139.5, 140.1, and 141.5 for C, NM, and MED, respectively) and chloride concentrations which were significantly higher for MED (95.3, 95.4, and 97.3 for C, NM, and MED, respectively). Villus lengths were significantly longer for MED (40.4, 40.9, and 53.7 for C, NM, and MED, respectively). Crypt depths were significantly shorter for NM (28.8, 23.5, and 31.4 for C, NM, and MED, respectively). Villus diameter was not significantly different between treatments. These results indicate that medicated milk replacers may enhance intestinal morphology and both nonmedicated and medicated additives may improve electrolyte concentrations in the blood.

Key words: calves, milk replacer, intestinal morphology

T293 Effects of using near infrared spectroscopy to segregate and feed high and low energy barley on feedlot cattle performance, animal health, and carcass characteristics. E. M. Hussey¹, R. E. Peterson¹, D. Plett², C. W. Booker¹, G. K. Jim¹, L. O. Burciaga-Robles¹, and M. L. May^{*1}, ¹Feedlot Health Management Services, Okotoks, AB, Canada, ²Western Feedlots, High River, AB, Canada.

The feed cost of gain accounts for 65–80% of the total cost of production, thus understanding the nutrient profile of the feed consumed by animals is important to investigate. A feeding trial was conducted to evaluate segregating barley by its estimated digestible energy value using near infrared reflectance spectroscopy (NIRS) measuring cattle health, performance, and carcass characteristics. In the study 9,007 heifers (initial BW 255.9 kg \pm 4.59) were randomly allocated to one of 3 dietary treatments with 10 pens per treatment. The treatments were low energy barley (LOW), high energy barley (HIGH) and a 50:50

blend of the low and high energy barley (50:50). The data were analyzed as a randomized complete block design using the PROC MIXED (SAS Institute, NC) with the fixed effect of treatment and the random effect replicate with linear and quadratic contrasts. Compared with LOW, HIGH had greater ($P < 0.001$) DE, DM, fat, NE, CP, and bushel weight, with lower values ($P < 0.001$) of ash, ADF, crude fiber, and waste. There was an effect ($P < 0.05$) to increase overall mortality with increasing energy content of the diet (LOW 1.9%; 50:50 2.97%; HIGH 2.94%). In addition, increasing the barley energy increase ($P = 0.04$) metabolic mortality and ($P = 0.06$) miscellaneous mortality. Increasing the energy of the barley fed to cattle tended ($P = 0.06$) to decrease ADG, carcass adjusted ADG ($P = 0.08$), decrease DMI ($P < 0.001$) and decrease on G:F ($P < 0.05$). There was a linear effect to decrease ($P = 0.02$) Canada 2 yield grade carcasses with increasing energy of the diet, with no effect of dressing percentage, or quality grade ($P > 0.16$). Use of NIRS technology to procure feedstuffs has considerable merit, however the implications of segregating barley by its nutrient content needs to be better understood.

Key words: near infrared spectroscopy, feedlot cattle, barley

T294 Supplementation of methionine hydroxy analog, chelated trace mineral and dietary antioxidants in the diet of beef bulls for color stability. I. Castillo*, G. I. Zanton, and M. Vazquez-Anon, *Novus International Inc., St. Charles, MO.*

In the Mexican Southeast Beef Region during the winter of 2009 and spring of 2010, 2 experiments were conducted at commercial feedlots to evaluate methionine hydroxy analog, chelated trace minerals, and a dietary antioxidant on ribeye color stability. The 2 experiments were designed similarly with the same treatment and control diets. The treatment diets were supplemented with methionine hydroxy analog (5g/hd/d; MFP), chelated trace minerals (250 mg/d of Zn, 77 mg/d of Cu, 167 mg/d of Mn; Mintrex), 3 mg/d of Se yeast (Zorien SeY), and dietary antioxidants (125mg/kg DM of Agrado Plus); minerals for the control group were formulated according to NRC 2000. For each experiment, 100 bulls (Zebu x European; 18 ± 2 mo and 455 ± 5 kg) housed in a commercial feedlot were randomly assigned to the control or treatment group pens. Bulls were on trial for a minimum of 42 and maximum of 45 d. Bulls were fed an isoenergetic (1.10 Mcal NEg/kg) and isonitrogenous (14% CP) diet twice a day that was composed of 70% corn, 12% DDGS, 8% of tropical grass hay and 10% of base mix (sugar cane molasses, urea, soybean meal, and vitamins and trace minerals). Following harvest, color was assessed at time 0 (30 min after cut), 3, 6, 9, 12, 24, 48 and 72 h for color stability during cooler storage with a Minolta 508d spectrophotometer with d65 light at 10° observer and AUSMET color scale. For experiment 1, meat from treatment-fed bulls compared with control-fed bulls ($n = 8$ /treatment/experiment) had significantly lower visual color assessment ($P < 0.05$) at time 6, 9, 12, 48, and 72 h while lightness (L^*) was significantly higher at all times. For experiment 2, meat from treatment-fed bulls had significantly lower visual color assessment at all times and significantly higher lightness at all times except for 12 and 24 h. There were no differences in average daily gain (1.6 kg/d) during the trials. From these studies it can be concluded that supplementing methionine hydroxy analog, chelated trace minerals, and dietary antioxidant to diets fed to finishing bulls significantly improved beef color shelf life.

Key words: antioxidant, beef color, trace minerals

T295 Evaluation of bimodal distributions to determine meal criterion in heifers fed a high-grain diet. J. C. Bailey*, L. O. Tedeschi, E. D. Mendes, and G. E. Carstens, *Texas A&M University, College Station.*

Meals are clusters of bunk visit (BV) events separated by short intervals that are differentiated from the next meal by a non-feeding interval that is long compared with the intervals within a meal. The longest non-feeding interval considered to be part of a meal is defined as meal criterion. The objective of this study was to determine which combination of Gaussian normal (N) and Weibull (W) 2-population distribution models best fit non-feeding interval data to distinguish intervals within (1st population) and between (2nd population) meals in beef cattle. Feeding behavior traits were measured in 119 heifers fed a high-grain diet (3.08 Mcal ME/kg DM) using a GrowSafe system. BV frequency and duration averaged 75 ± 14 events/d and 73.0 ± 22.3 min/d. The following 2-population distribution models; NN, NW, WW and WN were fitted to the \log_{10} -transformed interval lengths between BV events for each animal using R mixdist package (2.9–2). The intersection of the 2 distributions was computed as the meal criterion and used to derive meal frequency and duration data. Akaike's Information Criterion (AIC) was used to assess goodness of fit of the 4 models. The range in AIC values for the 2-pool NN, NW, WW and WN distribution models were 580 to 2923, 575 to 2884, 509 to 3226, and 726 to 3227, respectively. The NN and NW models resulted in longer ($P < 0.0001$) meal criterion (15.3 and 14.2 ± 7.2 min) compared with WW and WN models (10.8 and 10.6 ± 7.2 min). Consequently, meal frequencies were shorter and meal durations were longer when the N distribution was used to describe the first population. Each of the 4 models was fitted to individual animal BV data, and the model with the lowest AIC identified. A Chi-squared analysis was conducted to assess the number of animals identified for each 2-population distribution model. The frequencies (2, 76, 2, and 39) were different ($X^2 = 126.55$, $P < 0.0001$) among treatments, suggesting that 63.9% of the heifers were best fit by the NW model. Therefore, these results indicate that the NW 2-population distribution model is most appropriate to define meal criterion in beef cattle fed high-grain diets.

Key words: meal criteria, normal, Weibull distribution

T296 Effects of temperament classification and breed type on feed efficiency and feeding behavior traits in heifers fed a high-grain diet. J. C. Bailey*, G. E. Carstens, J. T. Walter, A. N. Hafla, E. D. Mendes, L. O. Tedeschi, and R. K. Miller, *Texas A&M University, College Station.*

The objective of this study was to evaluate the effects of temperament classification and breed type on performance, feed efficiency and feeding behavior traits in heifers fed a high-grain diet. Six trials were conducted over 3 consecutive yr with Angus (AN; $n = 185$), Braford (BO; $n = 241$), Brangus (BN; $n = 266$) and Simbrah (SI; $n = 196$) heifers from the Deseret Ranch; with 2 trials conducted each yr during the fall ($n = 415$) and spring ($n = 473$). Initial ages were 337 vs. 501 ± 86 d for heifers used in the fall (younger) and spring (older) trials. DMI and feeding behavior traits were measured for 70 d using a GrowSafe system. Exit velocity (EV), which is defined as the rate at which heifers exit a squeeze chute, was used as an objective measure of temperament. Within trial, heifers were classified into calm, moderate and excitable temperament groups based on ± 0.5 SD from the mean EV. Initial BW (318 vs. 308 ± 9 kg), final BW (425 vs. 401 ± 11 kg), ADG (1.45 vs. 1.27 ± 0.06 kg/d) and DMI (10.29 vs. 9.62 ± 0.47 kg/d) were higher ($P < 0.0001$) for heifers with calm temperament compared with

excitable heifers. Feed conversion (F:G) (7.36 vs. 8.23 ± 0.21 kg/d) differed ($P < 0.005$) between calm and excitable temperament class, but residual feed intake did not. In BO and BN heifers, there were no differences in F:G between calm and excitable groups, but in AN and SI, F:G was lower in the calm temperament group (EV x breed interaction; $P = 0.02$). Calm heifers spent more time ($P < 0.0001$) at the feed bunk (58.3 vs. 50.6 ± 3.8 min/d) than excitable heifers, but bunk visit frequency was similar between temperament groups. Meal frequency

was not affected by temperament classification, however, meal duration (138 vs. 132 ± 9 min/d), and the bunk visit per meal ratio (9.4 , 9.3 , 8.7 ± 1.1 events/meal) were higher ($P < 0.02$) for calm compared with excitable heifers. These results suggest that heifers with calm temperament have 13.5% greater ADG, consume 7.1% more DM, and have 10.6% lower F:G than heifers with excitable temperament.

Key words: feeding behavior, temperament