W336 The influence of lipidic sources on the cholesterol plasma levels of beef heifers. M. C. A. Santana*[1], T. T. Berchielli[1], R. A. Reis[1], G. M. P. Melo[2], and P. H. M. Dian[2], [1]*São Paulo State University*, *Jaboticabal, São Paulo, Brazil*, [2]*Camilo Castelo Branco University*, *Descalvado, São Paulo, Brazil*.

This research aims to evaluate cholesterol responses under different lipid sources and supplementation frequencies. This research was conducted throughout a 4-mo period during the dry season. The experiment was completely random, using a 3 × 2 factorial arrangement (3 supplements and 2 supplementation frequencies). The supplements were derived from 3 different sources, soybean grains, soybean oil and protected fat (Megalac-E), the 2 supplement frequencies were (A) Monday, Wednesday and Friday and (D) daily. In the 4-mo experimental period, August–November, blood samples were taken from the jugular vein after the morning feeding. Subsequently, these samples were centrifuged and stored until the cholesterol blood level was evaluated. In all treatments, no cholesterol differences were observed in August and November ($P > 0.05$). The animals that were given soybean oil supplements Monday, Wednesday and Friday showed lower cholesterol plasma concentration values ($P < 0.05$) in September. The Megalac–E that was supplied daily presented a higher cholesterol level in comparison to the daily supplement of soybean grain in October ($P < 0.05$). Overall, this data indicated that the cholesterol blood level can be influenced according to the feeding strategy during the dry season.

Table 1. Cholesterol plasma levels of heifers supplemented with different lipid sources at two different frequencies

	D–SG	A–SG	D–SO	A–SO	D–ML	A–ML
August	194^{Aab}	181^{Aa}	224^{Aab}	222^{Aa}	221^{Aab}	245^{Aa}
September	250^{ABa}	220^{ABa}	296^{Aa}	210^{Ba}	292^{Aa}	280^{Aa}
October	171^{Bb}	197^{ABa}	199^{ABb}	193^{ABa}	257^{Aab}	214^{ABab}
November	161^{Ab}	168^{Aa}	163^{Ab}	164^{Aa}	185^{Ab}	$169A^{Ab}$

Lowercase in columns and capital letters in rows differ ($P < 0.05$).

D = daily; A = alternately; SG = Soybean; SO = Soy oil, and ML = Megalac-E .

Key Words: soybean grain, soybean oil, protected fat

W337 Substitution of soybean meal by inactive dry yeast in diets of beef cattle: nutrient intake and productive performance. A. F. Campos[1], O. G. Pereira*[1], S. C. Valadares Filho[1], K. G. Ribeiro[2], and L. O. Rosa[1], [1]*Federal University of Vicosa*, *Viçosa, Minas Gerais, Brazil*, [2]*Federal University of Jequitinhonha and Mucuri Valleys*, *Diamantina, Minas Gerais, Brazil*.

The objective of this study was to evaluate the nutrient intakes and productive performance of Nellore cattle fed diets containing different levels of inactive dry yeast (0, 25, 50, 75 and 100%, DM basis) in substitution of soybean meal. Diets consisted of 60% corn silage and 40% concentrate (DM basis), formulated to be isonitrogenous (12% CP, DM basis). Thirty-five Nellore steers non-castrated, with initial live weight of 350 kg were allotted in a randomized blocks design with seven replicates. The animals were kept in individual pens of approximately 10 m2, with protected feeders and waterier. The experiment lasted 84 days, divided in three periods of 28 days after 15 days of adaptation. There was a negative linear effect ($P < 0.05$) of yeast levels on dry matter and crude protein intakes, kg/d, while DMI as percentage of the BW had a quadratic effect with maximum intake of 1.81% BW at 26.98% of yeast level. Quadratic effects ($P < 0.01$) of yeast levels were observed on NDF intake, with maximum intakes of 4.36 kg/d and 0.82% BW at 36.19 and 39.37% of yeast, respectively. The ADG decreased linearly ($P < 0.05$) as yeast levels increased in diets. However, no effects of yeast levels ($P > 0.05$) were observed on ether extract intake, dressing percentage, carcass daily gain and feed conversion, which were, on average 0.215 kg/d, 56.3%, 0.90 kg/d, and 7.57, respectively. Our results suggest that soybean meal might be replaced by inactive dry yeast until 30% of concentrate. However, the utilization of this co-product depends of economic factors.

Financial support by CNPq and FAPEMIG.

Key Words: average daily gain, crude protein, carcass dressing

W338 Changes on growth performance and ruminal variables of finishing Dorper × Pelibuey lambs fed a sorghum grain diet plus an exogenous phytase. G. Buendía-Rodríguez[1], S. S. González–Muñoz*[2], R. Basurto-Gutiérrez[1], M. M. Crosby-Galván[1], L. A. Adame-López[1], and L. J. Montiel-Olguín[1], [1]*CENIDFyMA INIFAP*, *Ajuchitlán, Querétaro, México*, [2]*Colegio de Postgraduados*, *Montecillo, Edo. de México, México*.

The objective of this study was to evaluate the effect of an exogenous phytase (FINASE, AB Enzymes, from *Trichoderma reesei*; 40,000 FTU/g) on lambs fed a 70% ground sorghum grain diet. Thirty-six Dorper × Pelibuey lambs (24.09±2.95 kg BW) were fed the sorghum diet plus 0, 12.5, 25.0 and 37.5 g phytase/t diet, during 75 days. The experimental design was completely randomized, with four treatments and nine replications per treatment. Data collected over time was analyzed as repeated measurements using the MIXED option of SAS, and means were compared with the Tukey test. Variables were average daily gain (ADG), dry matter intake (DMI), feed conversion (FC), concentration of bacteria and volatile fatty acids (VFA) in the rumen, plus phosphorus fecal excretion (PFE). Phytase did not change ($P \geq 0.05$) ADG (199, 228, 232, 206 g/d), DMI (1068, 1127, 1126, 1212 g/d), FC (5.59, 5.01, 4.89, 6.40), or ruminal bacteria concentration (2.91, 3.15, 3.00, 3.06; 10^{10}/mL). However, phytase addition increased ($P \leq 0.05$) propionate concentration in the rumen (23.40^{c}, 24.68^{bc}, 31.37^{a}, 30.43^{ab} m*M*) and PFE (1.10^{b}, 1.18^{ab}, 1.37^{a}, 1.21^{ab} g/d). Therefore, it may be concluded that propionate ruminal concentration as well as phosphorus fecal excretion were affected when an exogenous phytase was added to a 70% sorghum grain diet, fed to finishing Dorper × Pelibuey lambs.

Key Words: phytase, finishing lambs, growth and ruminal variables

W339 Thawed semen quality of beef bulls supplemented with calcium soaps of polyunsaturated fatty acid. H. O. Patino*, M. M. H. Ramirez, R. M. Gregory, and D.d. Ré, *Universidade Federal de Rio Grande do Sul*, *Porto Alegre, RS, Brazil*.

Twenty Hereford, Angus, Brangus and Braford mature bulls (950 kg average body weight) were used in a completely randomized design to evaluate the effect of supplementation with calcium soaps of polyunsaturated fatty acids (CSPUFA) on the semen quality undergone the cryopreservation process and subsequent thawing. Bulls were fed diets with similar levels of crude protein and metabolizable energy consisting of green forage and concentrate supplemented with CSPUFA or energy supplement (ES). For 75 days bulls in the CSPUFA treatment received Megalac-E (200 g/day) and bulls in the ES treatment received Cassava

meal (750 g/day). Bulls were naturally stimulated by cows and semen samples were collected with an artificial vagina every 15 days. Then collected semen was evaluated, diluted and frozen in 0.5 mL straws for later thawing. Assessments of sperm motility, hypo osmotic swelling test (HO), heat resistance test (TTR) and staining with Trypan blue were performed to evaluate the quality of thawed semen. The type of supplement did not affect HO (53.7%) and TTR (27.8%) after freezing. Thawed semen of bulls supplemented with CSPUFA had a 22% increasing in sperm motility (37.5 vs. 30.5%; $P = 0.10$), percentage of spermatozoa with normal acrosome (48.0 vs. 39.2%; $P < 0.05$) and number of live spermatozoa (51.5 vs. 42.2%; $P < 0.05$) in relationship to thawed semen of bulls supplemented with cassava meal. Energy supplementation in the form of calcium soaps of polyunsaturated fatty acids may increase the resistance to the processes of sperm cryopreservation and subsequent thawing, increasing the sperm motility, percentage of live spermatozoa and percentage of spermatozoa with normal acrosome

Key Words: bypass fat, thawed semen, cassava meal

W340 Effects of non-protein nitrogen in diets containing 15% wet distillers grains with solubles and steam-flaked corn on feedlot cattle performance and carcass characteristics. C. H. Ponce*[1], M. S. Brown[1], N. A. Cole[2], C. L. Maxwell[1], J. O. Wallace[1], and B. Coufal[1], [1]*Feedlot Research Group, Department of Agricultural Sciences, West Texas A&M University*, *Canyon,* [2]*USDA ARS Conservation and Production Research Laboratory*, *Bushland, TX*.

Our previous data suggest that the non-protein nitrogen (NPN) need in diets with 15% wet distillers grains with solubles (WDGS) for optimum growth performance may be slightly less than in 0% WDGS diets. The objective of the present study was to more clearly define the NPN need in diets with 15% WDGS. Steer calves (n = 296; initial BW = 344 kg) previously grown for approximately 75 d were adapted to a common finishing diet, blocked by BW, and assigned to 36 soil-surfaced pens (18 m^2 of pen space and 33 cm of bunk space/animal). Treatments included a control diet without WDGS (contained 3% NPN from urea, and cottonseed meal) and 15% WDGS with either 1.5, 2.25, or 3.0% NPN (0.52, 0.78, and 1.04% urea, respectively). Steers were implanted on d 1 with Revalor-XS and were fed twice daily for 165 d. The WDGS was obtained 3 times/wk from a local plant, and grain composition of WDGS averaged 22% sorghum and 78% corn. Overall DMI was 6.1% higher (P = 0.001) for steers receiving WDGS than for the control. Similarly, steers fed WDGS had 8% greater ADG (P < 0.008) on either a live or a carcass-adjusted basis than the control. However, overall gain efficiency on either a live or adjusted basis was not different among treatments ($P > 0.15$). Dietary NPN concentration did not influence growth performance ($P > 0.21$). Hot carcass weight was 10.9 kg lighter for the control than for 15% WDGS ($P = 0.01$), whereas dressing percentage tended ($P = 0.12$) to increase in a linear manner as NPN increased in diets with WDGS. Remaining measured carcass characteristics were not altered by treatment ($P > 0.16$). The control group tended to have ($P < 0.12$) fewer average Choice and higher and more low Choice carcasses than those fed WDGS, but the distribution of remaining quality and yield grades did not differ among treatments. Data suggest that growth performance may not be improved by including more than 1.5% added NPN in diets with 15% WDGS derived from a blend of corn and sorghum grains.

Key Words: wet corn distillers grains, growth performance, beef cattle

W341 Effects of nutrient restriction and ruminally undegradable protein supplementation during early to mid-gestation on beef cow offspring intestinal growth. A. M. Meyer*[1], P. Moriel[2], W. J. Means[2], M. Du[2], B. W. Hess[2], and J. S. Caton[1], [1]*Center for Nutrition and Pregnancy, Department of Animal Sciences, North Dakota State University*, *Fargo*, [2]*Department of Animal Science, University of Wyoming*, *Laramie*.

Thirty-six Angus × Gelbvieh cows were blocked by parity and randomly allocated by BW to 1 of 3 dietary treatments from d 45 to 185 of gestation: a hay-based control (CON) diet formulated to meet NRC requirements for mid-gestation; a nutrient restricted (NR) diet providing 70% of CON NE_m; or an NR diet fed with a ruminally undegradable protein supplement (NRP) formulated to provide similar essential AA flow to the duodenum as CON. After concluding the dietary treatment period, cows were managed as a single group through calving and weaning. Calves were placed in the feedlot by sex and maternal dietary treatment, and managed similarly during the growing and finishing phases. Steers and heifers were slaughtered at 448 ± 1.0 (mean ± SE) and 466 ± 1.1 d of age, respectively. Detailed necropsies of the small intestine were performed and jejunal samples were collected. Data were analyzed using slaughter group as a block. Slaughter weight (552.4 ± 10.2 kg) did not differ ($P = 0.76$) among maternal treatments. Ileal mass (g) tended to be greater ($P = 0.12$) and proportional mass (g/kg BW) was greater (1.55 vs. 1.26 ± 0.09 g/kg BW; $P = 0.02$) for offspring of CON cows than NR, although liver, duodenal, jejunal, and total small intestinal mass did not differ ($P \geq 0.38$) among treatments. Offspring born to NR cows had greater ($P < 0.05$) jejunal length than CON and NRP, whereas NR had shorter ($P = 0.03$) ileal length compared with CON. Total small intestinal length was greater ($P = 0.02$) for offspring from NR cows than NRP (3,754 vs. 3,448 ± 92 cm). Per unit of BW, ileal length was less ($P < 0.09$) in NR compared with CON and NRP. There were no differences ($P \geq 0.20$) in small intestinal density (g/cm tissue) due to treatment. Additionally, offspring jejunal DNA, RNA, and protein concentration (mg/g tissue) and content (total g) did not differ ($P \geq 0.74$) among maternal treatments. In this study, maternal nutrition of beef cows during early to mid-gestation affected small intestinal length, but not mass, of market-weight offspring.

Key Words: developmental programming, intestine, ruminally undegradable protein

W342 Time of collection affects starch losses in Nellore and crossbred cattle in commercial feedlots. M. Caetano*[1], A. J. C. Nuñez[2], G. B. Mourão[1], and D. P. D. Lanna[1], [1]*University of Sao Paulo, ESALQ*, *Piracicaba, Brazil*, [2]*University of Sao Paulo, FZEA*, *Pirassununga, Brazil*.

Grain sources, grain processing and different feed formulations have been extensively studied in order to improve the efficiency of starch utilization and animal performance. Starch digestion is closely and directly related to fecal starch content (FS%), however we have observed large variations in FS% through a 24-h period in experimental animals. The objective of this study was to determine the magnitude and variability of starch losses in commercial feedlots, as well as the influence of collection period, diet starch content, grain particle size after grinding, genetic group and starch source (corn or sorghum) on pH and FS%. Samples (n=935) were collected on 9 commercial feedlots, with 13 different diets using ground corn or sorghum as starch sources. Diets contained between 40 and 88% concentrate and starch contents between 14.6 and 45.9% in the dry matter (DM). Animals were classified as Nellore or European crossbreds. Morning collections were taken between 0700 and 1200 h and afternoon collections between 1300 and 1800 h. Diets and feces were immediately put on ice and analyzed for DM, ash and starch. Diets were also analyzed for particle size while feces were analyzed for

pH. The average values for FS% were 9.8±7.50% and the range was 0.1% to 41.6% in the DM. There was a difference ($P \leq 0.05$) between FS% for samples collected in the morning or afternoon for both Nellore and crossbred (7.5% and 6.6% in the morning vs. 2.2% and 4.7% in the afternoon, respectively). There was an interaction between genetic group and period of collection ($P \leq 0.01$), however there was no difference in FS% between diets with corn or sorghum ($P \geq 0.29$). There was a linear and quadratic increase ($P \leq 0.06$) in FS% as starch content of the diet increased and no effect of particle size in FS% for both sources ($P \geq 0.21$). Fecal pH was higher for corn than for sorghum (6.55 vs. 6.04; $P \leq 0.01$), and there was a negative correlation between FS% and fecal pH ($r = -0.57$ for corn and $r = -0.51$ for sorghum; $P \leq 0.01$). In conclusion, FS% differs depending on time of sample collection, demonstrating the importance of standardization of sampling procedures.

Key Words: beef cattle, corn, sorghum

W343 Parenteral supplementation of cross bred Brahman steers with copper and zinc in the western plains of Venezuela. R. E. Mora*[1], A. M. Herrera[1], D. L. Sánchez[1], C. F. Chicco[2], and S. Godoy[2], [1]*Universidad Nacional Experimental del Táchira*, *Venezuela*, [2]*Universidad Central de Venezuela*.

To evaluate parenteral Cu and Zn supplementation on daily body gain (DBG), body measurements (BM) and blood chemistry of cattle, an experiment was carried out in the western plains of Venezuela, with 60 cross bred Brahman steers with an average BW of 201.6±20 kg. The animals were uniformly divided in four groups and assigned to four treatments: 1) oral mineral supplementation (OMS); 2) OMS with injected Cu (OMS-Cu); 3) OMS with injected Zn (OMS-Zn); and 4) OMS with injected Cu and Zn (OMS-Cu-Zn). Fifty mg of Cu and 80.2 mg of Zn/100 kg were injected subcutaneously every 73 and 28 days, respectively. The experiment lasted 129 days. The animals were kept under grazing conditions, in pastures of *Brachiaria arrecta* and *B. mutica* with a stocking rate of 0.9 animal/ha. In addition animals had access to a complete mineral mix and to a broiler litter, molasses and urea supplement (800 g/d) with 23.2% PC. Body weight changes were measured every 28 days. At the same time blood and forage samples were taken for chemical analyses. Changes in heart girth (HG) and wither height (WH) were measured at the beginning and at the end of the experiment. Data were analyzed by ANOVA in a complete randomize design using a 2 × 2 factorial arrangement. Forage contained 4.0 ± 1.4% CP; 77.8 ± 2.7% NDF; 5.6 ± 2.5 ppm Cu and 22.5 ± 6.2ppm Zn. Poultry litter supplement had 71.5 ppm Cu and 328.8 ppm Zn. No differences were found among treatments for DBG, with an average of 363.1±273.8 g/d, showing ($P < 0.05$) an interaction time × Cu, with greater gains of supplemented animals in the transition dry-wet season (552.6 ± 201 vs. 487.4 ± 131.1 g/d), and lower in the wet season, when compared with the unsupplemented animals (535.9 ± 263.9 vs. 632.1 ± 191.6 g/d). No differences in BM and blood chemistry were found. It is concluded that under the conditions of the experiment, subcutaneous Cu and Zn supplementation had no effect on animal performance and blood chemistry.

Key Words: parenteral supplementation, daily gain, body measurements

W344 Effect of wheat distillers dried grains with solubles (DDGS) as a replacement for barley grain and barley silage on ruminal pH and fermentation in finishing beef cattle. Y. L. Li*[1,2], W. Z. Yang[1], M. L. He[1], T. A. McAllister[1], and K. A. Beauchemin[1], [1]*Agriculture and Agri-Food Canada, Research Centre*, *Lethbridge, AB, Canada*, [2]*Feed Research Institute, Chinese Academy of Agricultural Sciences*, *Beijing, China*.

A study was conducted to evaluate whether wheat DDGS can partially, or entirely, replace grain and forage in a finishing diet fed to growing beef cattle without increasing the risk of ruminal acidosis. Eight ruminally fistulated Angus heifers were assigned to a replicated 4×4 Latin square design with 4 treatments: control, low (25%), med (30%) and high (35%) DDGS (% of dietary DM). The diets consisted of barley silage, barley concentrate, and wheat DDGS in ratios of 15:85:0, 10:65:25, 5:65:30 and 0:65:35 (DM basis), respectively. Heifers were fed once daily for ad libitum intake. Ruminal pH was monitored continuously for 5 d each period using a wireless system (LRCpH). Mean ruminal pH linearly ($P < 0.01$) decreased from 5.94, 5.88, 5.70, to 5.75 as DDGS was substituted for barley silage. Duration of which pH<5.8 was longer for med (14 h) and high (13 h) DDGS diets than for control (10 h) and low DDGS (10 h) diets. Total VFA concentration (m*M*) quadratically increased ($P = 0.04$) and was the highest for med DDGS (149) and lowest for control (135) and high DDGS (135) diets. Molar proportion of acetate linearly ($P < 0.01$) decreased, whereas that of propionate tended to linearly ($P = 0.06$) increase with the increase of DDGS and decrease of silage, so that the fermentation changed to a more glucogenic pattern. Concentration of NH_3-N tended to ($P = 0.07$) be higher for DDGS diets (averaged 10.6 m*M*) than for the control diet (6.5 m*M*). The results indicate that replacing barley grain and silage with wheat DDGS in finishing diets may improve feed efficiency and growth rate due to a more glucogenic fermentation. However, animals may experience more rumen acidosis, suggesting that fiber from wheat DDGS was not physically effective.

Key Words: wheat DDGS, ruminal fermentation, beef cattle

W345 Effect of levels of canola meal supplementation on intake and apparent digestibility in wethers. F. Hentz*, G. V. Kozloski, T. Orlandi, G. F. E. Pacheco, S. C. de Àvila, and P. S. Castagnino, *Universidade Federal de Santa Maria*, *Santa Maria, RS, Brasil*.

The effect of increasing levels of supplementation of meal from biodiesel production canola (44.4% CP and 29.5% NDF; DM basis) on intake and apparent digestibility by wethers was evaluated. Eight Texel wethers were used in a replicated 4x4 Latin square design with 15-d periods (10-d adaptation, 5-d collection). Wethers were housed in metabolism cages and fed a basal diet consisting of sudangrass ad libitum (10% refusals). Treatments were sudangrass only (control), or supplemented with 5, 10 or 15 g/kg BW of canola supplement (90% canola meal, 10% finely ground corn), offered twice daily at 0800 and 1700 h. Feed, orts and fecal output were recorded daily on day 10 to 15 and samples collected and composited within animal and period. Data were analyzed using the PROC GLM procedure of SAS. Forage DMI decreased linearly ($P < 0.05$) from 531 to 326 g/d as supplement intake increased. Total DMI, which included forage and supplement and nitrogen intake increased linearly ($P < 0.05$) from 531 to 778 g/d and 10 to 36 g/d, respectively. Apparent digestibilities of DM, OM, and NDF were similar for all treatments and averaged 0.69, 0.76 and 0.66, respectively, whereas N apparent digestibility increased linearly ($P < 0.01$) from 0.74 to 0.87 as supplement levels increased. In conclusion, supplementation with canola meal exerts a negative effect on forage intake while improves total nutrient intake by wethers.

Key Words: biodiesel byproducts, intake, digestibility

W346 Evaluation of including elevated levels of wet distillers grains in diets of beef steers. J. M. Carmack*[1], P. M. Walker[1], J. D. Fehr[1], R. L. Atkinson[2], and L. A. Forster[3], [1]*Department of Agriculture,*

Illinois State University, *Normal,* [2]*Animal Science, Food and Nutrition, Southern Illinois University*, *Carbondale,* [3]*Archer Daniels Midland Co*, *Decatur, IL*.

Few studies have been conducted evaluating inclusion rates of modified wet distillers grains with solubles (DGS) above 55% of the diet DM for finishing beef steers. The objective of this trial was to compare feedlot performance and carcass characteristics of feedlot steers fed increasing levels of DGS. The treatments (percent DM basis) were: 80 shelled corn/5 soybean meal/15 corn silage (CON), 25 DGS/60 shelled corn/15 corn silage (25 DGS), 40 DGS/45 shelled corn/15 corn silage (40 DGS) and 70 DGS/15 shelled corn/15 corn silage (70 DGS). Angus cross steers (n=140; 367±31 kg BW) were stratified by weight to 20 pens. Treatments were randomly assigned to pens with unequal pen replication. Seventy head were harvested on d 165 when 90% were estimated to have reached low choice or higher quality grade. The remaining 70 head were harvested on d 200 when 90% were estimated to have reached low choice or higher quality grade. Steers fed 70 DGS had higher ($P < 0.05$) ADFI and DMI compared to steers fed CON and 25 DGS. Mid trial G:F, end of trial G:F and final wt were lower ($P < 0.05$) for 70 DGS steers than steers fed CON, 25 DGS and 40 DGS. ADG tended to be higher ($P = 0.07$) for CON, 25 DGS and 40 DGS steers. No significant differences were observed for KPH percent and liver score. Dressing percent, carcass wt, ribeye area, and quality grade were lower ($P < 0.05$) for 70 DGS steers compared to other treatments. CON and 25 DGS steers had higher ($P = 0.02$) yield grades and 25 DGS steers had higher ribfat ($P = 0.02$) than 40 or 70 DGS steers. No significant differences in quality grade between treatments were observed (CON=100%, 25 DGS=97%, 40 DGS=100%, 70 DGS=87%) but 70 DGS steers did trend lower ($P = 0.07$) with 12% grading select. Results from this study suggest that steers fed DGS at 25 or 40% of the diet (DM) have similar or improved performance compared to control steers while steers fed 70 DGS have reduced performance but similar quality grades.

Key Words: high levels distillers grains, feedlot performance, carcass

W347 Performance, feed intake, residual feed intake and feed:gain ratio in progeny of Nellore steers housed in individual or group pens. M. L. Nascimento*[1], R. R. Tullio[2], M. M. Alencar[2], J. S. Lima[3], L. D. C. Vieira[4], M. L. P. Silva[4], and D. P. D. Lanna[1], [1]*University of Sao Paulo*, *Piracicaba, Sao Paulo, Brazil*, [2]*Embrapa Pecuaria Sudeste*, *Sao Carlos, Sao Paulo, Brazil*, [3]*Rural Federal University of Pernambuco State*, *Garanhuns, Pernambuco, Brazil*, [4]*State University of Sao Paulo*, *Jaboticabal, Sao Paulo, Brazil*.

Feed is the most expensive input within any livestock production system, including beef cattle. Residual feed intake (RFI), defined as the difference between observed intake and that predicted from average weight and daily gain, has been proposed as a criterion for genetic selection. There have been very little studies with this trait in *Bos indicus* breeds. The objective of this study was to assess the phenotypic variability in RFI in Nellore cattle. In addition to that, we re-evaluated the effect of housing type (group and individual pen) on ADG, G:F, DMI, and RFI. Hundred fourteen Nellore steers, progeny of eighteen bulls, were fed individually for 77 days, where 41 housed in individual pens and 73 in group pens with electronic gates feeders. The diet contained 40% corn silage and 60% concentrate on a dry matter basis, and was supplied ad libitum, twice a day. Animals were classed as low or high RFI if their RFI fell 0.5 SD or more below or above the mean (zero). There was no difference among ($P > 0.05$) between animals housed in individual or group pens for average daily gain (1.21 versus 1.23 kg/d, respectively), DMI (9.46 versus 9.44 kg DM/d, respectively), G:F (8.06 versus 7.83 kg/kg, respectively) and RFI. Housing type effects may be more evident under once daily feeding rather than with the twice daily interactions adopted in the present study. This study shows that individual pens may be used as long as animals are stimulated to come to the bunk more than once daily.

Key Words: beef cattle, intake, feeding

W348 Residual feed intake in progeny of Nellore bulls. M. L. Nascimento*[1], R. R. Tullio[2], M. M. Alencar[2], J. S. Lima[3], L. D. C. Vieira[4], M. L. P. Silva[4], and D. P. D. Lanna[1], [1]*University of Sao Paulo*, *Piracicaba, Sao Paulo, Brazil*, [2]*Embrapa Pecuaria Sudeste*, *Sao Carlos, Sao Paulo, Brazil*, [3]*Rural Federal University of Pernambuco State*, *Garanhuns, Pernambuco, Brazil*, [4]*State University of Sao Paulo*, *Jaboticabal, Sao Paulo, Brazil*.

Residual feed intake (RFI), defined as the difference between observed intake and that predicted from average weight and daily gain, has been proposed as a criterion for genetic selection. There have been very little studies with this trait in Bos indicus breeds. The objective of this study was to assess the phenotypic variability in RFI in Nellore cattle. Hundred thirty-eight Nellore steers, progeny of eighteen bulls, were fed individually for 77 days. The diet contained 40% corn silage and 60% concentrate on a dry matter basis, and was supplied ad libitum. The prediction equation was DMI = 0.1105 × Average $BW^{0.75}$ + 1.32 × Average Daily Gain (ADG). Animals were classed as low or high RFI if their RFI fell 0.5 SD or more below or above the mean (zero), where 39 were classed in the low RFI and 43 in the high group. Individual values of RFI ranged from –3.44 to 3.84 kg/d. Mean RFI for the low and high RFI groups were −1.11 and 1.06 kg/d, respectively; by definition, weights and ADG were similar between RFI groups. There was a difference among RFI groups for intakes and feed:gain where the high RFI group had intake 27.6% greater ($P < 0.0001$) than the low RFI steers (10.44 versus 8.18 kg of dry matter/d) and 0.5 percentage points more on a % BW basis. Furthermore, the high RFI group showed worse feed:gain ratio. The bulls were different from each other ($P < 0.05$) for ADG, feed intake and feed:gain (kg of dry matter/d and % BW). These results show the phenotypic variability in RFI and other traits among progeny of Nellore bulls.

Key Words: beef cattle, intake, genetic selection

W349 Effects of supplemental vitamin E with different oil sources on growth, health, and carcass parameters of preconditioned beef calves. C. J. Mueller*[1,2], C. Sexson[1], and R. R. Mills[1], [1]*Oregon State University*, *Corvallis*, [2]*Eastern Oregon Agricultural Research Center*, *Union*.

This trial was designed to evaluate the impact of supplemental vitamin E with or without different oil sources during a 35-d preconditioning period. Sixty-four (224 ± 33 kg) Angus-cross calves were stratified by weight and sex then randomly allotted to one of four treatments: CON (corn-soybean meal (base) diet with no added vitamin E or oil), SE (base diet plus 150 IU supplemental vitamin E), ELA (SE diet plus 1.5% safflower oil) and ELNA (SE diet plus 1.5% linseed oil). Following preconditioning, calves were shipped to a feedlot where they received a modified live intranasal vaccine for Infectious Bovine Rhinotracheitis (IBR) and Parainfluenze-3 (PI_3) on d37 and d56 to stimulate immune activity. Blood samples were obtained after preconditioning (d35), post-transit to the feedlot (d36), post-initial vaccination (d42), and post-secondary vaccination (d63 and 70) to quantify glucose and antibody titers. Weights were collected throughout the study with carcass data collected at harvest. Gain and carcass data were evaluated as a

randomized complete block design with sex as block, using the following preplanned contrasts: CON vs. vitamin E (mean of SE, ELA, and ELNA), SE vs. OIL (mean of ELA and ELNA), and ELA vs. ELNA. No differences ($P > 0.10$) were detected for ADG or body weights during the preconditioning and finishing periods. No differences ($P > 0.10$) were detected for carcass measurements between treatment contrasts, with the exception of backfat tending ($P < 0.10$) to be greater in SE calves versus OIL calves. Morbidity rates were less than 1% and consistent across treatments. Supplementation of vitamin E resulted in greater amounts of IBR titer at d35 and d36 ($P < 0.05$). The SE calves had higher PI_3 titers ($P < 0.05$) at d35 compared to OIL calves, but were similar ($P > 0.10$) through the feedlot phase. No differences ($P > 0.10$) were detected for PI_3 titers or glucose after the preconditioning period for any contrast. Supplementation of preconditioning diets with vitamin E with or without dietary essential fatty acids showed limited improvement in gain and immune response indicators in weaned calves.

Key Words: vitamin E, preconditioning, cattle

W350 Level of ammonia-nitrogen required to maximize ruminal microbial efficiency. Y. Liang* and M. S. Kerley, *University of Missouri*, *Columbia*.

Microbial efficiency (MOEFF) in the rumen is a function of dilution rate (D), with achievement of maximum efficiency dependent upon adequate supply of peptides and ammonia-nitrogen. Equations predicting maximum MOEFF at varying D were used to predict microbial requirements for peptides and ammonia nitrogen. The objective of this experiment was to determine accuracy of these prediction equations to estimate ammonia-nitrogen requirement of ruminal microbes. Our hypothesis was that MOEFF and organic matter digestion, when peptide-nitrogen supply was adequate and ammonia-nitrogen was limiting, would respond to increasing supply of ammonia nitrogen. Diets consisting of corn, Soyplus, bloodmeal and urea were formulated to provide adequate RDP (peptides) and inadequate to adequate levels of ammonia-nitrogen. Four diets were fed to continuous culture fermenters, varying in urea content (0, 0.2%, 0.45%, 0.7% urea on dry matter basis). The 0.7% urea diet was calculated to provide adequate ammonia-nitrogen. Ammonia, pH and VFA concentrations, organic matter and protein digestion and MOEFF were measured. As RDN (urea) increased digestibility of OM (linear, $P < 0.09$), MOEFF (linear, $P = 0.15$) and protein (quadratic; $P < 0.05$) increased. Increasing RDN level increased ammonia (quadratic, $P < 0.02$), butyrate (linear, $P < 0.01$) and total volatile fatty acid (linear, $P < 0.1$) concentrations. No differences were measured for pH, acetic and propionic acid concentrations or acetic to propionic acid ratio among treatments. Measured RDP and RDN were similar to predicted values. We concluded that increasing VFA concentrations, organic matter digestibility and MOEFF as RDN increased in diets occurred due to availability of ammonia-nitrogen increasing. Elevation of ammonia-nitrogen in 0.07% urea diet was believed to have occurred because ammonia-nitrogen requirement was met, as predicted. Requirement for RDN has been well established and this research demonstrated that ruminant diets can be balanced to supply required levels of RDN.

Key Words: MOEFF, rumen degradable nitrogen, ruminal fermentation

W351 Effects of polyunsaturated fatty acid supplementation (PUFA) on forage intake and digestibility in beef cows. R. F. Cooke*, A. B. Scarpa, F. M. Nery, F. N. T. Cooke, and D. W. Bohnert, *Oregon State University - EOARC*, *Burns*.

The objective was to compare DMI and in situ forage digestibility in beef cows supplemented or not with a rumen-protected PUFA source. Three Angus × Hereford cows (724 ± 39 kg of BW) fitted with ruminal cannulas were allocated to a 3 × 3 Latin Square design containing 3 periods of 21 d each. Treatments consisted of grain-based supplements without (CO) or with the inclusion (10%; as-fed basis) of a PUFA source (PF; Megalac-R, Church and Dwight, Princeton, NJ) or a saturated fatty acid source (SF; Megalac, Church and Dwight). Treatment intakes were formulated to be iso-caloric and iso-nitrogenous, and offered daily at a rate of 0.7% of BW/cow/d. Within each experimental period, mixed alfalfa-grass hay was offered in amounts to ensure ad libitum access from d 1 to 13, and hay DMI was recorded daily. Data collected from d 8 to 13 were used to determine treatment effects on hay and total DMI. From d 14 to d 21, cows were restricted to receive 90% of their voluntary hay DMI. Immediately before treatment feeding on d 16, polyester bags containing 4 g of hay (DM basis) were suspended within the rumen of each cow, and incubated in triplicates for 0, 4, 8, 12, 24, 36, 48, 72, and 96 h. After removal, bags were washed, dried for 96 h at 50°C in forced-air ovens and weighed. Triplicates were combined and analyzed for NDF content. Hay and total DMI were reduced ($P < 0.05$) in PF cows compared to SF and CO cows (2.19, 2.30, and 2.31% of BW for forage DMI, SEM = 0.29; and 2.86, 2.98, and 3.05% of BW for total DMI, SEM = 0.29). However, no treatment effects were detected ($P > 0.48$) for ruminal degradation rate of hay DM (6.81, 7.48, and 6.86%/h for CO, PF, and SF; SEM = 0.40) and hay NDF (6.05, 6.43, and 6.17%/h for CO, PF, and SF; SEM = 0.30). Similarly, no treatment effects were detected ($P > 0.63$) for effective ruminal degradability of hay DM (64.53, 64.93, and 64.94% for CO, PF, and SF; SEM = 0.38) and hay NDF (71.24, 71.76, and 71.57% for CO, PF, and SF; SEM = 0.36). In conclusion, PUFA supplementation did not impact forage digestibility, but decreased forage and total DMI in beef cows.

Key Words: forage digestibility, polyunsaturated fatty acids, beef cattle

W352 Use of real-time ultrasound (RTU) measurements and carcass traits to assess internal fat in residual feed intake (RFI)-indexed Brahman bulls under grazing conditions. C. A. Hughes*[1], J. A. Carter[1], T. D. A. Forbes[2], F. M. Rouquette, Jr.[3], L. O. Tedeschi[4], R. D. Randel[3], and F. R. B. Ribeiro[1], [1]*Texas A&M University-Commerce*, *Commerce,* [2]*Texas AgriLife Research*, *Uvalde,* [3]*Texas AgriLife Research*, *Overton,* [4]*Texas A&M University*, *College Station*.

This study evaluated RTU and carcass traits to determine total internal fat (IFAT) of Brahman bulls (n = 16) grazing Coastal bermudagrass ([*Cynodon dactylon* (L.) Pers]) at two stocking rates (SR) for 60 d. Prior to the grazing trial, animals were fed a high roughage diet for 70 d, stratified as efficient (LRFI) or inefficient (HRFI), and randomly assigned to high (HSR) or low (LSR) SR pastures. RTU measurements were collected 5 d prior to harvest off pasture and consisted of KPH depth (uKPH), backfat thickness (uBF), ribeye area (uREA), rump fat (uRUMP), i.m. (uIMF), and BW. Bulls were harvested at 16 to 18 mo of age and about 450 kg. Shrunk BW (SBW) was recorded after an 18 h fast prior to harvest. At harvest KPH and internal organs were separated, dissected, and weighed. Total internal fat was determined by adding the KPH and physically separated organ fat weights. After a 48-h chill complete carcass data was collected. Data were analyzed using a split-plot design in a 2 × 2 factorial arrangement with pastures within SR as random factors. Prediction equations were developed using the PROC REG procedure with the stepwise selection. There were no interactions or main effects of SR ($P > 0.05$) and RFI ($P > 0.05$) on any of the carcass traits or RTU measured; except for carcass backfat

that was significant ($P = 0.051$) with LRFI bulls having more backfat than HRFI bulls (0.22 vs. 0.13 cm, respectively). A linear regression to predict IFAT from KPH and uRUMP (R^2 of 0.61 and square root of mean square error of 1.54 kg) was developed. The stepwise selection indicated a partial R^2 of 0.53 for KPH and 0.08 for uRUMP. A previously published equation to predict IFAT from KPH accounted for 53% of the IFAT variation of our data. No differences between RFI and SR using RTU were detected for Brahman bulls harvested direct off pasture. The RTU may improve the predictions of IFAT when KPH is available. A second year of data will be used to improve the precision of the IFAT predictive equations.

Key Words: ultrasound, internal fat, carcass

W353 Effects of co-ensiling direct-cut grass with corn modified wet distillers grain plus solubles on beef steer diet digestibility. R. P. Arias*[1], L. J. Unruh-Snyder[1], E. J. Scholljegerdes[2], A. N. Baird[1], K. D. Johnson[1], D. Buckmaster[1], R. P. Lemenager[1], and S. L. Lake[3], [1]*Purdue University*, *West Lafayette, IN*, [2]*USDA-ARS Northern Great Plains Research Laboratories*, *Mandan, ND*, [3]*University of Wyoming*, *Laramie*.

Four crossbred beef steers fitted with ruminal cannulas (BW = 556 ± 31 kg) were used in a 4 × 4 Latin square to evaluate the effects of feeding co-ensiled corn modified wet distiller's grain plus solubles (WDG) with direct-cut grass (DC; 30% DM; 40% Tall Fescue) on diet digestibility characteristics. Steers were fed for four 14-d periods (10-d for adaptation and 4-d of samples collection). Diets were formulated to be isocaloric and isonitrogenous and consisted of: 1) a corn silage control-diet supplemented with soybean meal (CON); 2) DC co-ensiled with WDG in a 3:1 (DM basis; CO-EN); 3) Haylage (DC ensiled without WDG) mixed with WDG at feeding (H+WDG); 4) Haylage mixed with corn dry distiller's grain plus solubles (DDG) at feeding (H+DDG). Dry matter and N intake did not differ ($P > 0.05$) across treatments, however, steers fed the CON diet had lower ($P < 0.01$) NDF intake compared to other treatments. Apparent total tract DM and N digestibility were greatest ($P = 0.02$), and total fecal DM and N excretion were lowest ($P = 0.02$) for steers fed the CON diet compared to all other diets. Steers fed the H+DDG diet had lower ($P = 0.02$) rumen ammonia concentration compared to the CON and H+WDG diets, with the CO-EN diet being intermediate. The CON diet also had greater ($P = 0.03$) total VFA concentrations and lower ($P = 0.03$) acetate:propionate compared to the all other diets. Results from this study suggest that although the feeding value of the CON diet was higher; there was a similar feeding value between direct-cut grass co-ensiled with WDG, and haylage diets fed with either WDG or DDG added at the time of feeding.

Key Words: distillers grains, co-ensiled, digestibility

W354 Acetate utilization in young crossbred calves is age-dependent. K. Pike*, W. A. D. Nayananjalie, T. R. Wiles, M. A. McCann, D. E. Gerrard, and M. D. Hanigan, *Virginia Polytechnic Institute and State University*, *Blacksburg*.

Early weaning is a management strategy for reducing lifetime feed intake in beef cattle. As the age at weaning decreases, however, the ability of the calf to utilize energy substrates may limit the effectiveness of this approach. Volatile fatty acids are critical in ruminant metabolism and acetate is the primary energy yielding substrate. We hypothesized that acetate clearance rates would provide information on postabsorptive capacity of young calves to utilize acetate. Four Angus × Simmental bull calves weighing 113±9 kg at 87 ± 2 days of age and 4 calves weighing 133±10 kg at 111±5 days of age were given a bolus infusion of acetate (4 mmol of acetate/kg of BW) over a 5 min period via an indwelling jugular catheter. Blood samples (5 ml) were collected from the jugular catheter at 5 min intervals over the first 30 min post-infusion and at 15 min intervals over the next 60 min. Blood samples were placed on ice immediately after collection and plasma was prepared and stored at −20° C until analysis. Plasma acetate levels were determined by isotope dilution using gas chromatograph-mass spectrometry. Acetate clearance rates were determined for each calf by fitting an exponential decay curve to the observed acetate concentration data using the NLIN procedure of SAS. Resulting clearance rates were analyzed using the MIXED procedure of SAS. Although, differences in clearance rates between older (0.003 ± 0.0002) and younger animals [0.002 ± 0.0002 ($\min \times BW^{.075}$)$^{-1}$)] was not significant ($P = 0.26$), greater basal blood acetate concentrations for the younger animals (2.9±0.6 vs. 6.8±0.6 mmol, respectively; $P < 0.01$) are consistent with the numerical reductions in clearance rates. These data suggest that utilization of acetate by tissues of calves is age-dependent and suggest that the weaning age may be limited by the ability of the tissues absorb acetate from the peripheral circulation.

Key Words: acetate, calves, clearance rate

W355 Ergot alkaloids induce vasoconstriction of bovine foregut vasculature. A. P. Foote*[1], J. L. Klotz[2], D. L. Harmon[1], L. P. Bush[1], and J. R. Strickland[2], [1]*University of Kentucky*, *Lexington*, [2]*USDA-ARS, FAPRU*, *Lexington, KY*.

Alkaloids produced by the *Neotyphodium coenophialum* endophyte in association with tall fescue (*Lolium arundinaceum*) are imputed to cause peripheral symptoms of fescue toxicosis. We hypothesized that theses compounds could correspondingly affect foregut vasculature. The objective of this study was to determine vasoconstrictive potentials of ergovaline (ERV), ergotamine (ERT), ergocryptine (ERP), ergocristine (ERS), ergonovine (ERN), ergocornine (ERO), lysergic acid (LSA), and an ethanol-extract of ground endophyte-infected fescue seed (EXT) on right ruminal artery and vein. Segments of right ruminal artery and vein were collected from the ventral coronary groove of predominately Angus heifers (n = 7) shortly after slaughter and placed in a modified Krebs-Henseleit buffer on ice. Vessels were cleaned of excess connective tissue and fat, sliced into 2-3 mm segments and suspended in a multi-myograph chamber with 5 mL of continuously oxygenated Krebs-Henseleit buffer (95%O_2/5% CO_2; pH 7.4; 37°C). Arteries and veins were equilibrated to 1.0 g and 0.5 g respectively for 90 min followed by addition of 120 m*M* KCl. Increasing concentrations of each compound were added to the respective chamber every 15 min following buffer replacement. Data were normalized as a % of the contractile response induced by KCl and were analyzed as a completely randomized design using PROC MIXED of SAS. No venous response was observed until 1×10^{-5} *M* and no arterial response was observed until 1×10^{-6} *M* for ERV and ERT, 1×10^{-5} *M* for ERP, ERO, and ERN, and 1×10^{-4} *M* for ERS. Alkaloid, concentration, and vessel affected contractility ($P < 0.05$). A greater arterial maximal response was observed for ERO, ERT, ERV, and EXT ($P < 0.05$) and the arterial and venous responses were not different for ERN, ERP, ERS, and LSA ($P > 0.05$). These results indicate that ergot alkaloids have potential to alter blood supply and drainage from the bovine foregut and the differential artery and vein responses may contribute to the fescue toxicosis syndrome.

Key Words: ruminal artery and vein, vasoconstriction, tall fescue

W356 Comparison of methods to predict carcass composition in grass and grain fed Angus steers. G. Acetoze*, G. D. Cruz, and H. A. Rossow, *University of California*, *Davis*.

Interest in grass finished beef has been increasing. However more research is needed to apply grass finishing to current beef production systems. Methods to predict carcass composition were developed based on data from grain finished cattle. However data are limited on the accuracy of using these methods for grass finish cattle. The objective of this study is to examine the effects of grass or high grain diets on the carcass composition of Angus steers and compare results from two methods for determining carcass composition. Carcass composition was estimated using specific gravity (SG) and composition of 9-11th rib section (RS) from the right side (Lunt et al., 1985), to compare the percentages of muscle, fat and bone of 14 grain-fed and 13 pasture-fed Angus steers. Steers were slaughtered when their estimated quality grade by ultrasound was greater than low select. Average yield and quality grades for grass finish steers were 58% and high select, and 63% and average choice for grain finish steers. Average live weights at slaughter were 610 and 630 kg with standard deviations of 87 and 78 kg for grass and grain diets, respectively. Pasture was a mix of white clover and ryegrass (15.8% crude protein, 49.8% NDF) and the feedlot diet was a 90% corn, 10% alfalfa finishing diet (13.0% crude protein, 26.3% NDF) on a dry matter basis. Data were analyzed with the general linear models procedure of SAS (SAS Institute, 2004) for method, type of diet and method diet interaction with bodyweight as a covariate. Muscle and fat % were significantly different ($P < 0.05$) for method used to estimate carcass composition with least squares means for muscle of 60.3% and 52.0% and fat of 24.1% and 31.7% for RS and SG, respectively. Bone % for diet and method, interaction between diet and method and use of body weight as a covariate for muscle, fat and bone % were not significant. These results imply that carcass composition is different for grass and grain finish steers. However, equations estimating muscle and fat % may need to be re-evaluated for grass finish steers.

Key Words: grass finish, carcass composition

W357 Rumen bacterial population dynamics of steers grazing winter wheat forage and a yeast culture supplement. D. W. Pitta*[1], W. E. Pinchak[1], S. E. Dowd[2,4], J. Osterstock[3], V. Gontcharova[2], E. Youn[4,5], K. Dorton[6], I. Yoon[6], B. R. Min[1], J. D. Fulford[1], T. A. Wickersham[7], and D. P. Malinowski[1], [1]*Texas AgriLife Research*, *Vernon,* [2]*Research and Testing Laboratory*, *Lubbock,* [3]*Texas AgriLife Research*, *Amarillo,* [4]*Medical Biofilm Research Institute*, *Lubbock,*[5]*Texas Tech University*, *Lubbock,* [6]*Diamond V Mills*, *Cedar Rapids, IA,* [7]*Texas A&M University*, *College Station*.

A study was conducted to study the dynamics in rumen bacterial populations using bTEFAP technique in steers grazing winter wheat with and without yeast supplementation on the Southern Great Plains of Vernon, Texas over a 75-day period. Experimental design included 14 (Angus × Hereford) ruminally cannulated steers grazing a basal winter wheat forage and grouped into 3 treatments based on yeast supplementation i.e., treatment 1 (control; n=4), treatment 2 (7% yeast; n=5) and treatment 3 (14% yeast; n=5). Both fiber and liquid fractions of rumen samples were collected on day 14, 28, 56 and 76 to investigate their associated bacterial populations. Wheat forage grazed in the first 30 days was vegetative and had a higher nutritive value (crude protein of 21% and In vitro dry matter digestibility of 80%) while the wheat forage grazed in the latter half of the Experiment was reproductive (neutral detergent fiber of 50%). Using BLASTn search, sequences were compared to databases and assigned to genera based on the similarity indices. The number of bacterial genera identified increased with time from day 14 (93, 109) to day 76 (271, 233) in both fiber and liquid fractions respectively. *Prevotella* was the most predominant genera in both solid (up to 50%) and liquid (up to 60%) fractions on all sampling days. *Rikenella* was the second most abundant genus in both fractions, progressively increased with time from 8 to 20%, with increasing in fiber content. There was an increase in the number of bacterial genera identified in the yeast supplemented steers and the increases were mostly confined to the minor genera (<0.9% of 16S rDNA sequences found). Yeast supplementation increased *Ruminococcus* (a major genus) consistently with time and minor genera like *Lactobacillus, Lactococcus, Megasphaera, Atopobium and Enterococcus* which fall under Lactic acid bacteria cluster. In summary, yeast supplementation influenced major genera only to a limited extent but more prominent changes in the minor genera. Changes in the major genera were attributed more to the changes in nutritional quality of wheat forage.

Key Words: wheat, yeast supplementation, bTEFAP pyrosequencing

W358 Expression of phosphate transporter in small intestine, kidney, and parotid salivary gland of cattle fed differing levels of phosphorus from wet distiller's grains. A. P. Foote*[1], B. D. Lambert1,2, J. A. Brady[2], M. S. Brown[3,4], J. B. Osterstock[4], J. C. MacDonald[3,4], and N. A. Cole[5], [1]*Tarleton State University*, *Stephenville, TX*, [2]*Texas AgriLife Research*, *Stephenville*, [3]*West Texas A&M University*, *Canyon*, [4]*Texas AgriLife Research*, *Amarillo*, [5]*USDA-ARS, CPRL*, *Bushland, TX*.

Phosphorus (P) in the diets of animals in confined animal feeding operations (CAFOs) is of great importance with the increasing concern of environmental impact of animal agriculture. Excess phosphorus in diets of cattle is excreted in the manure and, if improperly managed, can be washed into local surface water causing an increase in algae growth, while a dietary deficiency can lead to poor growth and other detrimental symptoms. The objective of this study was to determine the expression of NaPi-IIb in the small intestine and parotid salivary gland and NaPi-IIa in the kidney of cattle fed increasing levels of P (0.29, 0.38, and 0.52% P; 0, 30 and 60% wet distillers grain, respectively). Samples of parotid salivary gland and kidney along with the mucosa of the duodenum, proximal jejunum, distal jejunum, and ileum were collected at slaughter and immediately frozen in liquid nitrogen. Relative amounts of NaPi-IIa or NaPi-IIb mRNA were determined using RT-PCR. Expression of NaPi-IIa in the kidney was not affected by diet ($P = 0.15$). Expression of NaPi-IIb was highest in the ileum and proximal jejunum ($P = 0.058$). NaPi-IIb expression in the parotid and small intestine were also not affected by varying dietary P ($P > 0.2$). It appears that dietary P may play a lesser role in regulation of P transporter expression in ruminants than in other animal species.

Key Words: phosphorus, transporters

W359 Supplemental vitamin E concentration in beef finishing diets containing wet distillers grains with solubles: feedlot performance and carcass characteristics. D. B. Burken*[1], K. G. Hanger[1], R. B. Hicks[1], D. L. VanOverbeke[1], J. L. Wahrmund[1], B. P. Holland[2], J. J. Martin[3], P. K. Camfield[3], and C. J. Richards[1], [1]*Oklahoma State University*, *Stillwater*, [2]*South Dakota State University*, *Brookings*, [3]*Oklahoma Panhandle State University*, *Goodwell*.

The objective of this study was to evaluate feedlot performance and carcass characteristics of finishing beef steers fed diets containing wet distillers grains with solubles (WDGS) and supplemented with vitamin E to target improvements in meat quality. One hundred ninety–nine steers (BW = 363 ± 31.1 kg) of mixed *Bos indicus*, *Bos taurus*, and *Bos indicus x Bos taurus* breeding were blocked by BW and randomly assigned to 1 of 4 supplemental vitamin E levels (0, 125, 250, and 500 IU/hd/day) fed for the last 97 d of the feeding period. Two blocks were

fed for a total of 129 d and 3 blocks were fed for a total of 150 d. Steers were fed a rolled corn-based finishing diet with 35% WDGS and 7% ground alfalfa (DM basis). Individual BW were measured initially on two consecutive days, the initial day of vitamin E supplementation, and the day of harvest. Carcass data were collected at harvest. There were no differences in ADG, G:F, and DMI for the pre-vitamin E supplementation period, the vitamin E supplementation period, or over the entire feeding period ($P \geq 0.11$). Final BW, HCW, and carcass-adjusted final BW did not differ among treatments ($P \geq 0.06$). Carcass characteristics (LM area, fat thickness, calculated YG, and KPH) were not affected by treatment ($P \geq 0.13$). Percentage of cattle grading upper 2/3 choice, low choice, and select did not differ ($P \geq 0.57$), nor did percentage calculated yield grades 2, 3, and 4 ($P \geq 0.07$). Data from this study illustrate that vitamin E can be supplemented in WDGS diets during the last 97 days of the feeding period to target improvements in meat quality with no adverse effects on animal performance or carcass characteristics.

Key Words: beef cattle, feedlot, vitamin E

W360 Abomasal direct infusion of L-arginine and *trans*-10, *cis*-12 conjugated linoleic acid affect to lipogenic gene expression and enzymes activities in angus steers. S. H. Choi*[1], G. Go[1], D. T. Silvey[1], L. A. Gilmore[1], K. Y. Chung[2], B. J. Johnson[2], G. Wu[1], and S. B. Smith[1], [1]*Department of Animal Science, Texas A&M University*, *College Station,* [2]*Department of Animal and Food Science, Texas Tech University*, *Lubbock*.

This study was conducted with a cattle model to exam the hypothesis that direct abomasal infusion of *trans*-10, *cis*-12 conjugated linoleic acid (CLA) and/or arginine would depress lipogenic enzymes activities and lipogenic gene expression in bovine subcutaneous adipose tissues. Sixteen Angus steers were assigned randomly to four treatments: direct infusion into the abomasums with L-arginine (50 g/d) or L-alanine (100 g/d; isonitrogenous control) and/or *trans*-10, *cis*-12 CLA (100 g/d) in steers fed a corn-based finishing diet. Infusion program was: the 1st period (15 d), steers were infused L-arginine or L-alanine, the 2nd period (15 d), steers were infused each amino acids and/or *trans*-10, *cis*-12-CLA. Subcutaneous adipose tissue and blood samples were collected at beginning and end periods. The BW gain and ADG were significantly decreased ($P = 0.03$) by abomasal infusion of CLA and feed:gain was significantly increased ($P = 0.01$). The activities of 6-phosphogluconate-dehydrogenase, glucose-6-phosphate-dehydrogenase and fatty acid synthase were not affected by arginine or CLA infusion. Arginine depressed NADP-malic enzyme (ME) activity, but this was reversed by co-infusion of CLA (arginine x CLA, $P = 0.02$). The concentration of *cis*-9, *trans*-11 and *trans*-10, *cis*-12 CLA in plasma was increased by CLA infusion, and arginine infusion increased plasma arginine. AMP-activated protein kinase (AMPK) and stearoyl Co-A desaturase (SCD) gene expression were significantly enhanced ($P \leq 0.025$) by arginine infusion but decreased PPARγ gene expression. CLA significantly depressed C/EBP-β gene expression. Because arginine increased AMPK gene expression and depressed PPARγ gene expression and ME activity, we predict that over time, arginine would depress adiposity. Unexpectedly, these effects were antagonized by CLA.

Key Words: conjugated linoleic acid, arginine, beef cattle

W361 Effects of different casein supplements on concentration of soluble non-ammonia nitrogen in the liquid phase of ruminal and omasal digesta in Korean native steers. C. W. Choi*[1], H. G. Lee[2], Y. K. Oh[1], S. C. Lee[1], M. K. Song[3], S. H. Choi[4], and S. B. Smith[4], [1]*National Institute of Animal Science, RDA*, *Suwon, Korea*, [2]*Department of Animal Science, Pusan National University*, *Mirang, Korea*, [3]*Chungbuk National University*, *Cheongju, Korea*, [4]*Texas A&M University*, *College Station*.

Three ruminally and duodenally fistulated Korean native steers were used to study the effect of different casein supplements on concentration of soluble non-ammonia N (SNAN) from the rumen and to compare SNAN estimates based on ruminal (RD) and omasal digesta (OD) samplings. The treatments in a 3 × 3 Latin square design consisted of a basal diet (control) of rice straw and corn based concentrate (30:70) and two casein protein supplemented diets. Crude protein intake for control (0.65kg/d of dry matter (DM)) was increased to 0.82 or 0.81kg/d of DM by replacing the basal diet with intact casein (0.24 kg/d) or acid hydrolyzed casein (0.46 kg/d), respectively. For SNAN analysis, digesta was collected from both the rumen and the omasum at 2 h intervals after a morning feeding, sequentially centrifuged to eliminate microbes, and precipitated with trichloroacetic acid followed by centrifugation. Different N fractions i.e., free amino acids (AA), peptides and soluble protein in RD and OD were assessed using the ninhydrin assay. Acid hydrolyzed casein supplement decreased ($P = 0.05$) rumen pH compared with control. Casein supplements increased (at lease $P < 0.05$) concentrations of peptide and total SNAN, whereas different casein types did not affect mean concentration of SNAN fractions in both RD and OD. Mean concentrations of free amino acid (58.1 vs. 46.8 mg N/L) and total SNAN (158.6 vs. 143.9 mg N/L) were significantly ($P < 0.05$) higher in OD than those in RD. In both RD and OD, despite relatively high concentration of free amino acid N, peptide N constituted the largest proportion of total SNAN suggesting that hydrolysis of peptides to AA rather than hydrolysis of soluble proteins to peptides or deamination of AA to ammonia is the most limiting step in rumen degradation.

Key Words: soluble non-ammonia nitrogen, casein supplements, omasal digesta:

W362 Similar performance and carcass quality of beef bulls weaned at 3 or 6 months of age when slaughtered at a fixed body weight. M. Vestergaard*[1], A. M. Graumann[2], F. Strudsholm[2], and C. F. Børsting[3], [1]*Aarhus University*, *Tjele, Denmark*, [2]*Agrotech A/S*, *Skejby, Denmark*, [3]*Danish Cattle Research Centre*, *Tjele, Denmark*.

In order to utilize dry beef cows to graze extensive pastures, where low yield of grass does not allow proper management and performance of cow-calf combinations, there could be prospective in using an earlier rather than a traditional weaning age. The present experiment focuses on the weaned calves and study the effects of three mo (3M) compared with six mo (6M) weaning age on growth performance and carcass quality. Furthermore, three feeding strategies were included at both weaning ages: concentrates ad lib (CON), total mixed ration of concentrate and first cut grass silage ad lib (TMR), and separately fed concentrate at a fixed amount (4 kg/d) and first cut grass silage ad lib (SEP). The pelleted concentrate and silage had a DM content of 87 and 39%, respectively, and an energy content of 8.7 and 7.7 MJ NE/kg DM, respectively. A total of 83 bull calves in 14 blocks of 6 were included. Each block represented a breed and included Hereford, Angus, Simmental, Charolais, Limousin and crossbreds of these breeds. Within breed a fixed BW at slaughter was chosen in order to produce carcasses of similar fatness degree. The mean BW across all breeds was 560 kg, ranging from 520 kg with Hereford to 610 kg with Charolais. The actual BW at weaning was 145 (3M) and 251 kg (6M) ($P < 0.001$). At 6 mo of age, 3M calves were 17 kg heavier than 6M calves ($P < 0.05$). DMI from 6 mo of age to slaughter (7.30 kg), ADG (1.63 kg/d), age at slaughter (370 d), carcass wt (314.5 kg), dressing percentage (58.1), and EUROP carcass conformation and fatness were not different between 3M and 6M bulls. There

were no major interactions between weaning age and feeding strategy. NE per kg DM was higher for CON than TMR and SEP rations ($P < 0.001$). DMI was highest in TMR ($P < 0.001$) leading to the highest Gain to Feed ratio in CON and lowest in TMR ($P < 0.001$). Carcass characteristics were not affected except carcass fatness that was lowest in CON ($P < 0.01$).

Key Words: beef production, weaning age, feeding strategy

W363 Development of a fescue toxicosis model using a fescue seed extract. A. F. Koontz*[1], L. P. Bush[2], J. L. Klotz[3], K. R. McLeod[1], F. N. Schrick[4], and D. H. Harmon[1], [1]*Department of Animal and Food Sciences, University of Kentucky*, *Lexington,* [2]*Department of Plant and Soil Sciences, University of Kentucky*, *Lexington,* [3]*Forage-Animal Production Research Unit, USDA-ARS*, *Lexington, KY,* [4]*Department of Animal Science, University of Tennessee*, *Knoxville*.

This study was designed to examine the efficacy of a fescue seed extract for inducing fescue toxicosis in cattle. Four growing Holstein steers (BW = 309±36kg) surgically fitted with ruminal cannulas were utilized in a four phase crossover design experiment. The basal diet consisted of endophyte free fescue hay fed ad libitum. In phases 1 & 2, steers were ruminally dosed twice daily with 1kg either ground endophyte infected seed (S_{E+}) or ground endophyte free fescue seed (S_{E-}) for 7 d in order to develop a baseline of physiological responses during fescue toxicosis. In phases 3 & 4, steers were ruminally dosed twice daily with an extract from endophyte infected seed (E_{E+}) or endophyte free fescue seed (E_{E-}) for 7 d. During d 4-7 of each phase room temperature was increased to 32°C (HS). Steers on both S_{E+} and E_{E+} had reduced serum prolactin on D7. Steers on S_{E+} and E_{E+} had a reduction in total intake ($P < 0.05$) during HS, while there was no difference between treatments during thermoneutrality. Rate of intake was also reduced for S_{E+} and E_{E+} during HS. Consequently, animals on S_{E+} and E_{E+} tended to lose weight (−2kg) while animals on S_{E-} and E_{E-} tended to gain weight (+8kg). Skin temperature was higher ($P < 0.01$) during HS for both S_{E-} and S_{E+}. Core body temperature was higher ($P < 0.0001$), for extract treated animals as compared to those dosed with ground seed for both E+ and E-. Heart rate measurements show the opposite effect for both form and endophyte comparisons. There was no effect of treatment on respiration rate at thermoneutrality, however, HS tended to increase respiration rate for all treatments ($P < 0.1$) with E+ dosed animals higher than E- ($P = 0.0002$), as well as S animals higher than E ($P = 0.0012$). Blood pressure was only measured during E treatment. Systolic pressure was unaffected by treatment ($P = 0.203$), while diastolic pressures were higher for E_{E+} ($P = 0.008$). HS resulted in a reduction in systolic and diastolic pressure for E_{E+} ($P < 0.05$), while E_{E-} pressures were unchanged. These data indicate a fescue seed extract model is able to mimic the symptoms of fescue toxicosis induced by seed.

Key Words: bovine, fescue, model

W364 Flint corn grain processing and protein adequacy in rations for feedlot finished Nellore bulls. A. M. Pedroso*, M. S. Peres, F. A. P. Santos, G. B. Mourao, and T. G. Neri, *ESALQ/USP*, *Piracicaba, SP, Brazil*.

This trial was designed to evaluate processing methods of flint corn grain and increasing urea levels effects on performance of finishing Nellore bulls fed rations containing 12% grass hay and 88% concentrate (%DM) for 101 d. Rations contained 3 urea levels (0.5; 1.0 or 1.5% DM) and 73.5 to 75% corn grains, either steam flaked (SF), dry rolled (DR) or fine ground (FG). 178 Nellore bulls, with 343 kg average initial LBW were used in a complete randomized blocks design with a 3x3 factorial arrangement. Animals were kept in 36 concrete floor pens. Parameters evaluated were dry matter intake (DMI), average daily gain (ADG), feed efficiency (FE – kg ADG/kg DMI), dressing percentage (DP), fat thickness (FT) and rib eye area (REA). Data were analyzed using PROC MIXED of SAS. Bulls fed SF flint corn showed 20.5% and 11.7% better FE than bulls fed DR and FG respectively ($P < 0.05$). Fine grinding of flint corn increased cattle feed efficiency in 7.9% compared with dry rolling ($P < 0.05$). SFC resulted in higher DP than FGC and DRC as well as higher REA than DRC ($P < 0.05$). Increasing urea levels resulted in linear increases ($P < 0.05$) on DMI, ADG and FE. There was an interaction of grain processing and urea levels for ADG ($P < 0.06$). Cattle fed DR and FG responded to urea up to 1% while cattle fed SF responded to urea up to 1.5% of diet DM. Increases in energy values with steam flaking and fine grinding were higher with the flint corn used in this trial than the increase reported by the literature for dent corn.

Table 1. Performance of finishing Nellore Bulls fed flint DR, FG or SF and different urea levels

	SFC	FGC	DRC	0.5% U	1.0% U	1.5% U	SEM	Effect (Pr>F) - Corn × Urea	Linear Regression (urea levels)
DMI (kg/d)	7.72b	8.26a	8.08ab	7.88	7.85	8.32	0.1338	0.5173	0.0312
ADG (kg/d)	1.40a	1.34ab	1.21c	1.21	1.32	1.43	0.0357	0.0514	0.0002
FE (ADG/DMI)	0.18a	0.16b	0.15c	0.15	0.17	0.17	0.0035	0.1353	0.0012
DP (%)	52.8a	52.7b	52.1c	52.7	52.6	52.4	0.2175	0.6933	NS
REA (cm^2)	57.9a	55.6ab	54.3b	58.3	56.0	53.5	0.7841	0.1363	NS
FT (mm)	3.89	4.23	4.00	4.15	3.93	4.05	0.2287	0.3124	NS

Key Words: feedlot, flint corn grain processing, protein adequacy

W365 Effects of ruminal energy-protein synchronization on intake, nutrient digestibility, performance, carcass traits and composition of carcass gain in beef heifers. M. S. Duarte, P. V. R. Paulino*, G. S. Viana, E. A. Fonseca, L. H. P. Silva, J. P. I. S. Monnerat, R. Mezzomo, J. Cavali, J. F. Lage, I. M. Oliveira, S. C. Valadares Filho, and M. F. Paulino, *Universidade Federal de Viçosa*, *Viçosa, MG, Brazil*.

This study was carried out aiming to evaluate the effects of ruminal energy–protein synchronization on intake, nutrient digestibility, feed conversion, animal performance, carcass traits and composition of carcass gain of beef heifers. Twenty crossbred heifers (average BW of 240 kg) were used. At the beginning of the trial, four animals were slaughtered as reference group and the sixteen remaining animals were randomly assigned to 4 treatments, in a 2 × 2 factorial design: two levels of concentrate (40 and 80%, based on dry matter) and two levels of rumen undegradable protein (RUP – 48.8 and 27.2% of the diet CP). At the end of the trial, the animals were slaughtered. There was no interaction (P>0.05) between concentrate and RUP level on any variable studied. Dry matter intake (DMI), nutrients intake and nutrients digestibility were not affected ($P > 0.05$) by RUP level. The animals fed the highest RUP level had higher ($P < 0.05$) average daily gain (ADG) and therefore greater feed conversion than the animals fed the lowest RUP level (1.18 kg/d; 6.44 and 0.96 kg/d; 7.38, respectively). Concentrate level did not affect ($P > 0.05$) DMI, feed conversion and ADG. The animals fed 80% concentrate diets had higher intake of TDN and EE, and lower intake of NDF ($P < 0.05$) compared to the animals fed 40% concentrate diets. The digestibilities of all nutrients, except the NDF, were greater ($P < 0.05$) for the 80% concentrate diets. There was no effect ($P > 0.05$) of RUP level on carcass traits and composition of carcass gain. Similarly, concentrate level did not affect ($P > 0.05$) the composition of carcass gain. The animals fed 80% concentrate diets had larger ($P < 0.05$) rib eye area than the animals fed 40% concentrate diets. Although feeding more

RUP led to improved feed conversion and increased ADG, the interaction of RUP and dietary energy level was not an important attribute in formulating beef heifer′s diet as no effect of ruminal energy-protein synchronization on performance, intake, nutrient digestibility, carcass traits and composition of carcass gain were detected.

Key Words: feedlot, performance, rumen undegradable protein

W366 The effects of restrictive feeding over the winter on the performance of prepartum crossbred beef cows. K. M. Wood*, I. B. Mandell, and K. C. Swanson, *University of Guelph*, *Guelph, Ontario, Canada*.

Eighty-seven mature pregnant beef cows, primarily of Angus and Simmental breeding, were used in a randomized complete block design to investigate the effects of restrictive feeding on performance over two separate winters. Cows were randomly assigned to one of three dietary treatments: Control (CON; n =24); fed free choice grass/alfalfa haylage, constantly restricted (CONST; n= 32); fed haylage at 1.8% of bodyweight, and stepwise (STEP; n = 31); fed haylage at 1.6% of bodyweight for 56 d and then fed 2% of bodyweight for 56 d. Individual feed intakes were recorded using the Calan gate system. Cows were weighed every 14 d to adjust intake and ultrasounded for rump fat, backfat and % intramuscular fat and body condition scored (BCS) on d 1, 56, 112. Calf birthweight was also recorded. Data were analyzed using Proc Mixed in SAS; the model included the effect of block (year of experiment), parity and dietary treatment, as well as the random effect of pen. Contrast statements were used to compare CON versus CONST and STEP, and CONST versus STP with significance declared at $P \leq 0.05$. Total DM intakes were similar ($P = 0.84$) for total DM intake between CONST and STEP; however cows fed CON had the greatest ($P < 0.001$) DM intakes. Average daily gains over the entire experiment were 1.1 ± 0.06 (LSM ± SEM) for CON, 0.83 ± 0.05 for CONST and 0.87 ± 0.05 for STEP and were greater ($P \leq 0.001$) for CON than the two restrictive treatments. There were no differences ($P > 0.17$) amongst dietary treatments for changes in backfat or calf birthweight. Cows fed CON deposited more ($P < 0.001$) rump fat and had a greater ($P < 0.001$) gain in BCS than cows fed CONST or STEP. Cows fed CONST or STEP did not differ ($P = 0.95$) for change in rump fat and CONST tended ($P = 0.08$) to have greater increase in change in BCS. In conclusion, method of restrictive feeding did not affect the overall performance of pregnant beef cows and may be an acceptable alternative to feeding free-choice haylage rations to prepartum beef cows over the winter.

Key Words: beef cows, restrictive feeding, winter rations

W367 Comparison of wheat dried distillers grains with solubles, alone or in combination with barley grain, as protein and energy sources for beef stocker calves grazing fall pasture and winter field bale grazing. L. P. Clark*[1] and H. A. Lardner[1,2], [1]*University of Saskatchewan*, *Saskatoon, Saskatchewan, Canada*, [2]*Western Beef Development Centre*, *Humboldt, Saskatchewan, Canada*.

Two experiments were conducted to evaluate and compare supplementing wheat dried distiller′s grains with solubles (DDGS) alone or in combination with barley grain on the performance of beef calves in a fall pasture (EXP1) or winter bale grazing (EXP2) program. In each experiment, weaned, cross-bred calves (n=54) were stratified by body weight and randomly allocated to 1 of 3 supplement strategies in a replicated (n=3) completely randomized design. In EXP1, calves (initial BW 211.9 ± 1.23 kg) were supplemented at 0.8% BW either (i) barley+canola meal (70:30 blend); (ii) barley+wheat DDGS (70:30 blend) or (iii) 100% wheat DDGS. In EXP2, calves (initial BW 205.8 ± 0.42 kg) were supplemented at 1.2% BW either (i) 100% wheat DDGS; (ii) 100% barley or (iii) wheat DDGS+barley (50:50 blend). The fall pasture study (EXP 1) was conducted on an 18 ha crested wheatgrass (*Agropyron cristatum*) pasture divided into 9, 2-ha paddocks. The winter bale grazing study (EXP 2) was conducted on a 5.4 ha paddock further divided into 9, 0.6 ha paddocks. In EXP2 calves had ad libitum access to grass-legume hay (12.5% CP, 57% NDF) fed in round bale feeders. Calves were weighed at start, every 14 d and end of both experiments. All weights were adjusted for a 4% shrink. Paddock was the experimental unit and data were analyzed using the Mixed model procedure of SAS. Average daily gains did not differ ($P = 0.33$) between supplement groups during the 33-d graze period on crested wheatgrass (EXP1) or the 109-d (EXP2) winter bale graze period ($P = 0.41$). These data suggest that wheat DDGS compared to barley supplementation will result in similar performance of stocker calves grazing fall pasture or winter bale grazing.

Key Words: wheat dried distillers grains with solubles, calves, grazing

W368 Carcass characteristics of Nellore heifers finished on pasture system with partial substitution of soybean meal for sunflower crushed seeds. S. L. N. Cerilo*, R. H. de Tonissi e Buschinelli de Goes, H. L. Lima, A. R. M. Fernandes, K. A. de Souza, K. C. da Silva Brabes, A. F. Marquez, and E. R. de Oliveira, *Universidade Federal da Grande Dourados*, *Dourados,MS, Brasil*.

The carcass characteristics of Nellore heifers finished in *Brachiaria humidicola* pasture, supplemented with partial substitution of soybean meal by sunflower crushed seeds were evaluated in the dry season. Twenty-four animals were used with initial body weight (BW) of 300 kg and initial body condition (BC) of 2 (in score 1 to 5), with approximately 24 months of age, were distributed at random into four paddocks of 3000 m^2, in a complete randomized design. The supplement was fed at 0.8% BW/animal/day. The supplements were based in corn and soybean meal, which soybean meal was replaced by sunflower crushed seeds in the proportions of 0, 20, 40 and 60%. All the concentrate containing 20% CP, varying oil levels (2.5, 4.7, 7.0, 9.2%). The animals were weighed and monitored for BC every 21 days and slaughtered at 378.5 kg and 3.8 of body condition. There was no difference ($P > 0.05$) between the levels of substitution for hot carcass weight (HC), cold carcass weight, carcass yield, carcass length, liver, fat thickness (FT), yield estimated grade (YG=72.92-0.489FT-0,02HC +0.119LEA), and Brazilian commercial cuts (BCC= 60,33-0,015HCW-0,462FT+0.11LEA), which presents a average of 197.05 kg, 193.33 kg, 52.03%, 1.2m, 3.59 kg, 4.52 mm, 74.18% and 62.14%, respectively. Effect ($P < 0.10$) was observed for the inclusion of sunflower crushed seeds for fat accumulation in peri-renal and loin eye area (LEA). The animals supplemented only corn and soybean meal presents a lower peri-renal fat (1.87kg), the substitution of 40% of sunflower crushed seeds, showed accumulation of 3.02 kg and those receiving 20 and 60% had an average of 2.69 and 2.05 kg, these values may be associated with oil levels of supplement. The loin eye area showed values of 69.2, 58.2, 57.8, 64.0 cm^2, and LEA/100 kg BW of 18.48, 15.01, 15.50, 17, 25, for the replacement levels of 0, 20, 40, 60%, respectively, which shows that the weight and size of animals can influence the area of loin eye. Partial substitution of soybean meal with sunflower crushed seeds, does not alter the carcass characteristics of Nellore heifers finished in grazing systems.

Key Words: fat thickness, loin eye area, yield grade

W369 Changes in ruminal parameters, of steers supplemented with sunflower crushed seeds in partial substitution of soybean meal. H. L. Lima*, R. H. de Tonissi e Buschinelli de Goes, S. L. N. Cerilo, A. L. Teodoro, K. A. de Souza, L. da Silva Fernandes, M. G. de Menezes Gressler, and E. R. de Oliveira, *Universidade Federal da Grande Dourados*, *Dourados, MS, Brasil*.

To evaluate the effect of partial substitution of soybean meal with sunflower crushed seeds on the ruminal pH and ammonia of steers supplemented at pasture, we used four animals fitted with permanent ruminal cannula, with initial weight of 300 kg, randomly divided into individual paddocks of *B. brizantha* cv. Marandu in 4 × 4 Latin square and a split-plot; the averages was compared by Tukey test at 5% probability. The supplements were provided in the amount of 0.8% BW/animal/day and consisting of corn, soybean meal and mineral, with 20% of crude protein. The soybean meal was replaced in the proportions of 0, 20, 40, and 60% for sunflower crushed seeds. The estimated ether extract of the supplements were 2.5, 4.7, 7.0, 9.2%, respectively. The determination of pH and ammonia ($N\text{-}NH_3$) occurred in the rumen at 0, 2, 4, 6 and 8 hours after supplementation. There was no effect ($P > 0.05$) for pH according to the level of substitution of soybean meal for sunflower crushed seeds and time of collection. This values had an average of 6.41, exceeding the limits of 6.2, for the occurrence of inhibition of fiber digestion. For contents of $N\text{-}NH_3$ have a significant effect ($P < 0.05$), and a quadratic response ($Y = 15.42 + 2.77x - 0.31x^2$, $r^2 = 0.55$), where the ammonia peaks occurred between 2 and 4 hours after the supplement supplied, with values of 22.56 and 21.40 mg/dL, these may be associated with the solubility of food constituents of the supplements, which have medium to high ruminal degradability. The $N\text{-}NH_3$ values remained above the limits of 10 mg/dL, which maximizing dry matter intake of animals, and digestion for grazing animals. Supplementation of steers on pasture with sunflower crushed seeds in partial replacement of soybean meal does not alter the ruminal pH and ammonia.

Key Words: supplement, pH, ammonia

W370 Effect of supplemental fat sources on rumen fermentation of a high-concentrate diet using a dual-flow continuous culture system. R. C. Araujo*[1], S. Calsamiglia[2], M. Rodríguez-Prado[2], S. Cavini[2], and A. Ferret[2], [1]*ESALQ, Universidade de São Paulo*, *Piracicaba, SP, Brazil*, [2]*Universitat Autònoma de Barcelona*, *Bellaterra, Spain*.

The negative effects of dietary fats on fiber digestion have been used as a criteria to limit the content of fat and degree of unsaturation in ruminants. However, the relevance of reduced fiber digestion in high-concentrate beef diets is questionable. Six 1320-mL dual-flow continuous culture fermenters were used in a complete randomized design (2 periods of 5 d adaptation and 3 d sampling each) to determine the effects of including 4.86% (DM basis) of hydrogenated palm oil (HIDROPALM, Norel S.A., Madrid, Spain), soybean oil, or olive olein on rumen fermentation of a high-concentrate diet. Temperature (38.5°C), and liquid (10%/h) and solid (5%/h) dilution rates were constant. The pH was allowed to fluctuate with an upper limit of 6.4, but average pH was not affected by treatments (average of 5.66). Fermenters were fed 95 g DM/d in 2 equal portions. Diets consisted of 10% barley straw, 45% ground corn, 22.6% barley, 16.2% soybean meal, 1.35% mineral and vitamin premix, and 4.86% supplemental fat source (DM basis). Diets were formulated to achieve 8.0% EE, with similar CP (14.4%) and NDF (16.9%) concentrations (DM basis). Data were analyzed using PROC MIXED of SAS and differences declared at $P < 0.05$ by Tukey test. True DM (average of 69.2%), CP (average of 77.4%), NDF (average of 19.2%) and ADF (average of 13.0%) degradabilities were not affected by treatments. No differences were observed for ammonia (average of 0.03 g/d), non-ammonia (average of 2.76 g/d), dietary (average of 0.50 g/d) and bacterial (average of 2.28 g/d) N flows. Total volatile fatty acids concentration (105.2 m*M*), acetate (average of 37.5%), and propionate (average of 53.0%) proportions as well as the acetate:propionate ratio (average of 0.70) were not affected by treatments. Results indicate that inclusion of soybean oil or olive olein at 4.86% of dietary DM does not affect rumen fermentation of a typical high-concentrate feedlot diet when compared with hydrogenated palm oil.

Key Words: hydrogenated palm oil, olive olein, soybean oil

W371 Dried distillers grains as a protein supplement to cattle consuming Bermudagrass hay. Z. J. Rambo*, J. E. Sawyer, C. L. Skaggs, and T. A. Wickersham, *Texas A&M University*, *College Station*.

We compared 3 protein supplements, cottonseed meal (CSM), dried distillers' grains (DDG), and DDG plus urea (DDGU), in steers fed Bermudagrass hay (7.4% CP). Ruminally and duodenally fistulated steers (463 kg) were used in a 13 × 4 incomplete Latin square with 13 treatments and 4 periods. Treatments were arranged as a 4 × 3 factorial plus a negative control (NC), which received no supplement. The factorial consisted of 4 levels of supplemental N (52, 104, 156, and 208 mg N/kg BW) from each of three sources of supplemental N (CSM, DDG, and DDGU; 49.6, 31.0, and 47.5% CP). Periods were 17 d long, with 10 d for adaptation, and 7 d for collection. A source by N level interaction ($P = 0.05$) was evident for forage OM intake. Forage OM intake increased quadratically ($P = 0.02$) with increasing amounts of CSM, numerically ($P = 0.16$) with increasing amounts of DDGU, and were not influenced by increasing amounts of DDG. Forage OM intake increased from 39.5 g/kg $BW^{0.75}$ for NC to 43.4, 45.3, 45.9, and 41.9 g/kg $BW^{0.75}$ for 52, 104, 156, and 208 mg N/kg BW from CSM, respectively. Total digestible OM intake increased (linear; $P < 0.01$) with increasing level of supplementation for all three sources. Total digestible OM intake was 21.0 g/kg $BW^{0.75}$ for NC and 27.7, 27.3, and 28.4 g/kg $BW^{0.75}$ for CSM, DDG, and DDGU, respectively, at the highest level of N. Organic matter digestion increased (linear; $P \leq 0.03$) for all sources. At the highest level of supplementation OM digestibility averaged 59% versus 53% for steers receiving NC. There was a source by level interaction ($P = 0.03$) for ruminal ammonia concentration. This interaction is explained by linear increases ($P \leq 0.05$) in ammonia concentrations for all three sources; however, increases were greatest for DDGU, followed by CSM, and DDG. When N was provided at 208 mg N/kg BW, ruminal ammonia averaged 4.84, 3.29, and 8.61 m*M* for CSM, DDG, and DDGU, respectively. Dried distillers' grains were effective at increasing total digestible OM intake although the mode of action differed from CSM.

Key Words: Bermudagrass, dried distillers grains, protein

W372 Effect of residual feed intake, gender, and breed composition on blood urea nitrogen concentration in an Angus-Brahman multibreed herd. R. O. Myer*[1] and M. A. Elzo[2], [1]*University of Florida*, *NFREC, Marianna*, [2]*University of Florida*, *Gainesville*.

Blood urea N can be used as an indicator of N use and excretion by an animal. The objective of this research was to asses the effect of residual feed intake (RFI) and post weaning growth rate on blood plasma concentration of urea N (PUN) in 188 bulls, heifers, and steers (mean = 296.5 kg, SD = 37.3 kg) ranging from 100% Angus to 100% Brahman. Calves were assigned to pens in a GrowSafe feeding facility by sire group and

sex, and self-fed a total mixed ration (corn, cottonseed hulls, chopped grass hay, cottonseed meal, molasses, and mineral-vitamin supplement; 90% DM, 14% CP, 1.5 mcal/kg DM NEm, and 0.9 mcal/kg DM NEg). The pre-trial adjustment period lasted 21 d. Individual daily feed intake was collected during the 70 d feeding trial; BW were recorded every 2 wk. Blood (jugular) was drawn on d 0 and d 56 for PUN. Residual feed intake (RFI) was computed as the difference between actual and expected intakes. The RFI groups were high (RFI > mean + 0.5 SD), medium (RFI between mean ± 0.5 SD), and low (RFI < mean - 0.5 SD; SD = 2.0 kg DM/d). Data (PUN) were analyzed using a mixed model. Fixed effects were sex of calf, RFI group, and Brahman fraction of calf; daily feed intake and mean exit velocity were covariates. Random effects were sire and residual. Overall ADG was 1.25 ± 0.26 kg/d. Brahman had higher d 0 and d 56 PUN concentrations than Angus ($P < 0.01$). Sex affected both d 0 and d 56 PUN ($P < 0.01$) concentrations with bulls having the lowest and heifers the highest. Day 0 PUN concentration was negatively associated with ADG ($P < 0.01$). Only d 56 PUN concentration was related to RFI ($P = 0.02$), indicating that more feed efficient animals also had lower PUN.

Key Words: beef cattle, feed efficiency, blood urea

W373 Body composition and tissue deposition in Nellore, F1 Simmental × Nellore and F1 Angus × Nellore steers fed at maintenance or ad libitum with two levels of concentrate in the diet. I. M. Oliveira*, P. V. R. Paulino, M. I. Marcondes, C. A. Neves, S. C. Valadares Filho, E. Detmann, J. Cavali, V. R. M. Couto, and N. K. P. Souza, *Universidade Federal de Viçosa*, *Viçosa, MG, Brazil*.

The objective of this study was to evaluate the effects of feeding regimen (FR) and genetic group (GG) on body weight gain (EBWG) composition and tissue deposition rate in beef steers. Forty eight steers, 18 months old, were used (20 Nellore (NE), 20 F1 Simmental × Nellore (NS) and 20 F1 Angus × Nellore (NA) with initial BW of 265.6±6.4 kg; 325.3±4.7 kg and 324.6±6.0 kg, respectively). Four animals from each GG were slaughtered at the beginning of the trial in order to estimate initial body composition. A 3 × 3 factorial arrangement was used, being 3 GG and 3 FR (maintenance and ad libitum with 2 concentrate allowance levels: 1 and 2% of BW), with 6 replicates for the ad libitum treatments and 4 animals fed at maintenance. After 136 days on feed all animals were slaughtered and their body and carcass composition were directly determined. There was no interaction ($P > 0.05$) between GG and FR on any variable assessed. Animals fed at maintenance had larger ($P < 0.05$) proportions of bones and muscle in the carcass than the ad libitum fed animals (19.7; 65.11 vs. 15.2%; 60.5% respectively) and less fat (17.97 vs. 23.45%). NE carcass had larger proportion of muscle (62.74%) and smaller ($P < 0.05$) proportion of fat (19.94%) than that observed in the carcass of the crossbred animals (61.10 and 22.19%). The rate of tissue deposition (adipose and muscular) in the carcass was lower in NE animals (168.55 and 152.08 g/d) and in those fed with 1% of concentrate (192.42 and 200.89 g/d) when compared to crossbred animals (229.11 and 259.51 g/d) and those fed with 2% of concentrate (225.43 and 246.50 g/d). Protein accretion in the EBWG was largest ($P < 0.05$) in the animals that received more concentrate (201.51 vs. 166.02 g/d, for 1 and 2% of BW on concentrate, respectively). NE animals deposited less fat and protein ($P < 0.05$) in the EBWG (477.22 and 145.81 g/d, respectively) than crossbred animals (660.68 and 202.75 g/d), while NA had more ($P < 0.05$) fat deposition in the EBWG than NS animals (720.28 vs. 601.08 g/d).

Key Words: feedlot, empty body weight, crossbred cattle

W374 Effect of supplementing a combination of lysine and methionine on growing cattle performance and carcass composition. N. D. Luchini*[1] and M. J. de Veth[2], [1]*Adisseo*, *Alpharetta, GA*, [2]*Balchem Corporation*, *New Hampton, NY*.

Lysine (Lys) and methionine (Met) have been identified as the two amino acids (AA) most limiting growth of beef cattle. The objective of this study was to determine the effect of supplementing metabolizable Lys and Met on growth and carcass composition of growing bulls. One hundred and twenty bulls (333 ± 52 kg; mean ± SD), randomly allocated to one of two treatments were fed a basal diet composed of corn grain, distillers grains, grass hay and a mineral/vitamin premix at 56.8, 14.8, 25.2 and 3.2% DM, respectively with no supplemental AA (CON) or the basal diet with supplemental Lys (4.59 g/kg DM of a lipid-encapsulated Lys (AminoShure-L) and Met (1.24 g/kg DM of the isopropyl ester of 2-hydroxy-4-(methylthio) butanoic acid (Metasmart) (L+M). Using CNCPS V.6.1, estimated concentrations of Lys and Met in metabolizable protein were 5.43% and 1.95% for CON and 6.41% and 2.18% for L+M. The AA products were mixed with ground corn and mixed into the TMR. Daily DMI was recorded for each animal using the GrowSafe feeding system. Bulls were weighed on 2 successive days at the start and end of the study. Ultrasound (for carcass quality) was made at the start and end of the study. Data was analyzed using the PROC Mixed procedure of SAS and pretreatment measurements were used as a covariate. For average daily gain (ADG) and backfat thickness there was an interaction with the covariate (pretreatment body weight (BW) and backfat thickness, respectively) and therefore covariates were treated as categorical variables with two levels (low and high groups). L+M increased BW gain ($P < 0.05$) and tended to increase DMI ($P < 0.15$) compared to CON. ADG (kg/d) increased ($P < 0.01$) in the high BW (1.88 and 1.68) for L+M and CON, respectively There was an increase (17%; $P = 0.02$) in backfat thickness for the high group of animals on L+M treatment compared to the CON. There were no effects of L+M on longissimus muscle area or intramuscular fat. Results indicate that supplementing a balanced ratio of the two most limiting AA can improve growth and ADG of growing bulls.

Key Words: beef cattle, lysine, methionine

W375 Effect of protein and energy supplementation on voluntary intake and ruminal parameters in steers. F. P. Portilho* and L. F. Barros, *University of Brasilia*, *Brasília, DF, Brazil*.

Supplementation may have associative effects (positive or negative) between the forage and concentrate with important consequences on the efficiency of nutrient use. This study aimed to evaluate the effects of different amounts of protein and energy supplement on the behavior of the parameters pH and N-NH3 in rumen fluid and on the voluntary intake and degradability of dry matter (DM) and NDF) of forage in cattle receiving hay Coast-cross (*Cynodon dactylon*). We used five steers with mean of 290 kg of BW, cannulated in the rumen, fed ad libitum hay of Coast-cross, and minerals. Five treatments were evaluated, consisting of 4 levels of daily protein and energy supplementation (0.25, 0.50, 1.00 and 1.50 kg DM to 100 kg BW / day) of corn meal, soybean meal and urea, and one control treatment received only hay and mineral mix ad libitum. Data were collected from voluntary intake, degradability of dry matter and NDF of hay, the pH and N–NH3. The intake was calculated daily by the leftovers. The potential degradation in situ was made according to Mertens (1993). The pH of the samples was measured according to the technique described by Fenner 1965, adapted by VIEIRA (1980). The experimental design used was the Latin square (5 × 5) and analysis were performed using SAS (1990) GLM procedure. The highest level of protein and energy supplementation (1.5 kg DM to 100 kg BW /

day) reduced the pH, reducing ruminal degradation of DM and NDF of Coast-cross hay, however, insufficient to modify intake. The highest concentrations of ruminal N–NH3 were observed at the highest levels of intake of protein-energy supplement (1.0 and 1.5 kg DM to 100 kg BW / day). These levels of supplementation, concentrations of ruminal N–NH3 remained longer near the plateau and decreased slower than the other treatments supplemented. There was no additive effect of intake of different amounts of protein-energy supplement on the intake of DM and NDF of hay. The rumen degradation of DM and NDF was not influenced by intake of protein-energy supplement to the level of 1.0 kg DM to 100 kg BW / day.

Key Words: steers, intake, degradation

W376 Energy requirements adjusted by milk yield of beef cows in Uruguay. V. Gutiérrez Castro*, M. Carriquiry Fossemale, and A. C. Espasandín Mederos, *Facultad de Agronomía, UdelaR*, *Montevideo, Uruguay*.

Maintenance energetic cost is affected by body composition, weight (BW) and metabolic activity of organs, such as mammary gland, therefore, the potential of milk production has been associated with maintenance requirements. Thirty-two beef cows (Hereford, n=10; Angus, n=10; F1, n=12) were used to predict maintenance requirement based on milk yield in grazing conditions. The experiment was carried at the Experimental Station Bernardo Rosengurtt (Cerro Largo, 32°35′S, 4°15′W). Cows grazed native pastures with two different forage allowances average of 10 vs. 6 kg DM/100 kg BW/d for HI and LO, respectively). Milk yield and composition were measured once a month from 30 to 120 days postpartum. Cows were milked and separated from their calves 12 overnight before being milked using an portable machine (previous injection with oxytocin, 10 IU/cow). Milk was weighed and a sample obtained for protein, fat, and lactose analyses. Data were analyzed with a mixed model that included forage allowance, cow and calf breed, calf sex, and forage allowance by breed interaction as fixed effects, cow within breed as a random effect, and days postpartum as a covariate. Cow BW and milk production were affected ($P < 0.05$) by breed and forage allowance. Cow BW was greater for F1 than purebred cows in both HI and LO (average 460 vs. 434 ± 7 for F1 vs. purebred cows, respectively). Milk peak productions were greatest for F1 cows in HI and lowest for purebred cows in LO (9.3, 9.1, 8.4, and 6.1 ± 0.6 kg/d for F1 and purebred cows in HI and LO, respectively). These differences influenced energy requirements during lactation with the greatest values in HI forage allowances (18.7 to 14 Mcal/d and 13.8 to 8.9 Mcal/d from first to fourth month postpartum, for HI and LO, respectively) and F1 cows (18.7 to 14.8 Mcal/d and 17 to 13.3 Mcal/d from first to fourth month postpartum, for crossbred and purebred cows, respectively). Forage allowances affected maintenance requirement adjusted by milk yield by modifying BW and body condition score, and milk production, being only greater for F1 cows in HI forage offers.

Key Words: milk, beef cattle, Mcal/d

W377 Productive performance during fattening phases of Nellore and F1 Nellore x Brahman fed with three different diets. I. S. Silva*, F. A. Barbosa, J. M. S. Diogo, R. A. Mandarino, and F. C. E. Botelho, *Faculty of Agronomy and Veterinary Medicine, University of Brasília - UnB*, *Brasília/DF, Brazil.*

The experiment evaluates productive performance in fattening cattle, divided into two genetic groups and subjected to three diets in a feedlot. The experiment was conducted from August to November 2009, lasting 96 days, 14 days of adaptation of animals. The herd was composed of 42 bulls with an average age of 23 months, 21 breed Nelore (NEL) and 21 crossbreed Nelore × Brahman (NBR). Each genetic group was divided into three diets, with 7 animals each: SIL - corn silage and concentrate (corn grain, soybean meal, soybean hulls, urea and mineral supplement) at a ratio of 25:75 (dry in matter), PEL - exclusive diet of pellets; GRN - diet with whole grain corn and pellets. The experiment was conducted in a completely randomized in a 2 × 3 factorial, divided as follows: NBRSIL, NBRPEL, NBRGRN, NELSIL, NELPEL and NELGRN. In all treatments the food supply was ad libitum divided into three treatments daily. The average initial body weights (BWI) were: 350.7, 350.6, 355.8, 379.2, 375.7, 376.1 kg, for NELSIL, NELPEL, NELGRN, NBRSIL, NBRPEL and NBRGRN respectively. The final body weights (BWF) averages were: 500.0, 464.4, 479.7, 410.8, 471.9 and 501.5 kg for NELSIL, NELPEL, NELGRN, NBRSIL, NBRPEL and NBRGRN, respectively. The average hot carcass yield (HCY) was 58.51, 58.44, 57.34, 58.4, 58.61 and 58.05 for NBRSIL, NBRPEL, NBRGRN, NELSIL, NELPEL and NELGRN, respectively. The genotypes and diets did not affect the PI, PF and HCY ($P > 0.05$). The average daily gain (ADG) was 1.346 and 1.219 kg for NEL and NBR, respectively, without differences in the genetic group. There was influence of diet on the weight gain SIL was higher than PEL and similar to the GRN, 1.470, 1.093 and 1,299 kg, respectively ($P < 0.05$). The dry matter intake averaged was 9.25 and 9.65 kg /animal/day for NEL and NBR, respectively. The feed conversion was 7.17 and 8.26 for NEL and NBR, respectively ($P > 0.05$). The genetic group had no influence on average daily gain and hot carcass. The diet affected the average daily gain with better results for SIL and GRN, but had no differences for yield and hot carcass weight.

Key Words: carcass yield, genetic group, weight gain