Ruminant Nutrition: Beef Cattle

W282 Effect of oat maturity and variety on yield and nutritive value for grazing cattle. M. L. Drewery*[1], L. A. Redmon[2], and T. A. Wickersham[1], *[1]Texas A&M University, College Station, [2]Texas AgriLife Extension, College Station.*

Oats (*Avena sativa*) often provide earlier grazing, later maturity, and greater forage production during warm weather than wheat or rye, but are often more sensitive to cold stress. Therefore, in warmer climates, oats are often used as a forage resource. However, data are limited on production and nutritive value for many oat varieties when used as a forage source. Accordingly, the objective of this study was to determine the yield and nutritive value of 4 oat varieties (TAMO 405, Harrison, BOB, and Exp 1) at 6 maturities. A prepared seedbed was divided into 4 blocks with each variety randomly assigned to a plot within each block. Plots were established on Oct 20, 2009 in Burleson County, Texas, and were provided with 167 kg/ha of 16–20–0 fertilizer at planting and top dressed with 43 kg N/ha (N-32) on Feb 18, 2010. Samples were clipped from each plot using 0.09 m^2 square on Dec 10, Jan 11, Feb 15, Mar 11, Apr 14, and May 10. All samples were dried at 60°C for 72h, ground to pass a 1-mm screen and subsequently analyzed for OM, N, and NDF. In vitro true digestibility (IVTD) was determined on all samples, except those collected in Dec. Statistical analysis was completed using SAS with variety and maturity in the model and using block as the random term. Maturity linearly ($P < 0.01$) increased DM production while CP content linearly ($P < 0.01$) decreased from 27% in Dec to 8% in May. The largest decrease in CP, from Mar to Apr, corresponded with the greatest increases in DM yield. Nitrogen yield (kg N/ha) increased quadratically ($P < 0.01$), with a plateau occurring at the Mar sampling. Through the Feb sample, NDF content was <29%, then increased rapidly to above 57% for samples collected in Apr and May. Samples collected in Jan and Feb had IVTD above 93%, then linearly decreased ($P < 0.01$) with advancing maturity to <59% in May. There was a tendency ($P = 0.07$) for variety to effect IVTD. Digestible DM kg/ha increased linearly ($P < 0.01$) with advancing maturity from <660 kg in Jan to 2,481 kg in May. Variety did not significantly affect yield or nutritive value. Maturity was the primary driver of forage production, which increased with advancing maturity, while nutritive value declined.

Key words: grazing, oats

W283 Replacing grain and silage with wheat distiller grains: effects on feed intake, daily gain, carcass characteristics, and blood metabolites in finishing beef cattle. W. Z. Yang*[1], T. A. McAllister[1], J. J. McKinnon[2], and K. A. Beauchemin[1], *[1]Agriculture and Agri-Food Canada, Research Centre, Lethbridge, AB, Canada, [2]Department of Animal & Poultry Science, University of Saskatchewan, Saskatoon, SK, Canada.*

A study was conducted to evaluate DMI, daily gain, carcass quality and blood metabolites in feedlot beef steers fed diets that varied in proportion of wheat dried distillers grains with solubles (DDGS) with DDGS replacing barley grain or silage. Two hundred crossbred steers (489 ± 30 kg) were blocked by weight and randomly allotted to 20 pens (5 pens per treatment). Steers were fed one of 4 diets: control, low (25DDGS), medium (30DDGS), and high (35DDGS) wheat DDGS (DM basis). The control diet consisted of 15% barley silage and 85% barley concentrate; the 3 DDGS diets were formulated by substituting 20% barley grain and 5, 10 and 15% silage, respectively, with 25, 30 and 35% wheat DDGS so that the 35DDGS diet contained no silage. Steers were weighed at the start and end and every 21 d during the experiment. In comparing with the control, DMI (10.9 vs. 11.6 kg/d) of calves fed 25DDGS was greater ($P < 0.01$), but final BW tended ($P < 0.06$) to be lower (635 vs. 621 kg), so they were less efficient (130 vs. 113 g gain/kg DMI; $P < 0.01$). With substitution of DDGS for silage, DMI linearly ($P < 0.01$) decreased from 11.6 to 10.7 kg/d without changing final BW or ADG, consequently, feed efficiency linearly ($P < 0.02$) improved from 113 to 128 g/kg DMI. Overall, carcass characteristics were not different among the 4 diets. Plasma glucose averaged 1.0 g/L and was not affected by diet, whereas plasma urea N was doubled from control (95 mg/L) with DDGS diets (195 mg/L). Results indicate that partially replacing barley grain and silage with wheat DDGS in high-grain diets reduces growth and feed efficiency. However, further substitution of wheat DDGS for silage such that the diets contained minimal or no silage did not adversely impact cattle growth or feed efficiency.

Key words: feedlot beef cattle, growth performance, wheat DDGS

W284 Effects of restricted versus conventional dietary adaptation over periods of 14 and 21 days on feedlot performance and carcass characteristics of Nellore cattle. D. D. Millen*[2,3], F. S. Parra[1], J. R. Ronchesel[1], M. D. B. Arrigoni[1], C. L. Martins[1], R. S. Barducci[1], L. M. N. Sarti[1], R. D. L. Pacheco[1], L. C. Vieira Júnior[1], M. C. S. Franzói[1], R. Espigolan[1], J. M. P. Silva[1], M. F. Val[1], F. P. Luiz[1], E. A. Chacon Filho[1], *[1]São Paulo State University (UNESP), Botucatu, São Paulo, Brazil, [2]São Paulo State University (UNESP), Dracena, São Paulo, Brazil, [3]Supported by FAPESP, São Paulo, São Paulo, Brazil.*

This study, conducted at the São Paulo State University feedlot, Botucatu Campus, Brazil, was designed to determine effects of restricting intake of the final finishing diet (REST) as a means of dietary adaptation compared with diets increasing in concentrate (STEPUP) over periods of 14-d and 21-d on overall feedlot performance and carcass characteristics. The experiment was designed as a completely randomized block with a 2 × 2 factorial arrangement, replicated 6 times (5 bullocks/pen), in which 120 18-mo-old yearling Nellore bulls (372.2 ± 21.5 kg) were fed in 24 pens for 84-d according to the treatments: STEPUP for 14-d, STEPUP for 21-d, REST for 14-d, and REST for 21-d. The STEPUP program consisted of ad libitum feeding of 3 adaptation diets over periods of 14-d or 21-d with concentrate level increasing from 55% to 85% of diet DM. The REST program consisted of restricted intake of the final diet (85% concentrate) with programmed increases in feed offered until yearling bulls reached ad libitum access over periods of 14-d or 21-d. No significant ($P > 0.10$) protocols and days main effects were observed for any of the feedlot performance parameters analyzed: final BW, ADG in kg (STEPUP = 1.554, REST = 1.545; 14-d = 1.556, 21-d = 1.539), G:F ratio (STEPUP = 0.147, REST = 0.149; 14-d = 0.148, 21-d = 0.148) and DMI in kg, however a interaction was found ($P < 0.05$) for DMI in % of BW. Animals in STEPUP for 21-d treatment presented greater DMI (% of BW) than yearling bulls in REST for 21-d (2.43% vs. 2.34%). With respect to carcass characteristics, no significant ($P > 0.10$) protocols and days main effects were observed for LM area, 12th rib fat thickness and kidney-pelvic fat, however, yearling bulls in treatments that lasted 14-d presented heavier ($P < 0.05$) HCW (285.61 kg vs. 278.72 kg) and increased ($P < 0.05$) dressing percentage (56.76% vs. 56.13%) when compared with animals allocated in protocols that lasted 21-d. The adaptation in 14-d did not negatively affect feedlot performance of

Nellore cattle and improved HCW and dressing percentage regardless of adaptation protocol.

Key words: adaptation, feedlot, Nellore

W285 Effect of three diets on carcass quantitative traits in cattle Nellore and crossbreed F1 Nellore × Brahman. I. S. Silva*, F. A. Barbosa, S. L. S. Cabral Filho, R. A. Mandarino, and P. C. A. C. Alves, *Faculty of Agronomy and Veterinary Medicine, University of Brasília-UnB, Brasília/DF, Brazil.*

The experiment evaluates the characteristics of carcass in fattening cattle, divided into 2 genetic groups and submitted to 3 diets in a feedlot. The herd was composed of 42 bulls with an average age of 23 mo, 21 were Nellore (NEL) and 21 crossbreed Nellore x Brahman (NBR). Each genetic group was divided and allotted to 3 diets, with 7 animals each. The experimental groups were: SIL-corn silage and concentrate (corn grain, soybean meal, soybean hulls, urea and mineral supplement) at a ratio of 25:75 in dry matter, PEL-exclusive pellets diet; GRN-whole grain corn and pellets diet. The experiment was conducted in a 2x3 factorial, completely randomized design. After slaughter, were evaluated at the half carcass the rib-eye area (REA) and the subcutaneous fat thickness (SFT), and the body composition (muscle, bone and fat) of the section HH (between the 9th and 11th rib). There was no difference to the SFT in comparison of genetics or diets ($P > 0.05$). The REA was similar for the different diets, but differ among the genetic groups ($P < 0.05$), with values 69.25 and 77.15 cm^2 for NEL and NBR. The percentage of bone was not different for diets or genetic groups. The percentage of muscle was similar to the genetic groups but was different for the diets. On the diet PEL the proportion of muscle was higher than in SIL and GRN, 60.43, 55.25 and 57.03%, respectively ($P < 0.05$). The percentage of fat was different for both genetic groups and diets ($P < 0.05$). The NEL was 17.48% while NBR obtained 14.72%. The SIL diet had a high proportion of fat (19.60%), compared with the diets PEL and GRN, 12.98 and 15.96% respectively ($P < 0.05$). The genetic groups did not influence the SFT, or the percentage of bone and muscle in the section HH. The diets did not affect REA, SFT and the percentage of bone in section HH. The REA was higher in NBR in comparison with the NEL. The percentage of fat in the HH section was higher for the NEL compared with NBR. The results indicate that PEL showed a higher percentage of muscle in the HH section between diets, while the SIL and NEL had a greater percentage of fat.

Key words: beef cattle, feedlot, genetic group

W286 Effects of supplementing an exogenous proteolytic enzyme on growth performance in finishing beef steers. J. M. Vera*[1], C. T. Noviandi[1], A.-H. Smith[2], D. R. ZoBell[1], and J.-S. Eun[1], *[1]Department of Animal, Dairy, and Veterinary Sciences, Utah State University, Logan, [2]Danisco USA, Inc., Waukesha, WI.*

An exogenous proteolytic enzyme (EPE) has been previously found to increase in vitro NDF degradability of dried distillers grains with solubles (DDGS). To further investigate the effects of supplementing EPE, 48 Angus crossbred finishing beef steers (473 ± 37.3 kg BW) were used to assess the growth performance when fed a DDGS-based TMR without (control) or with an EPE supplementation in a completely randomized design. The finishing TMR consisted of 5% alfalfa hay, 20% corn silage, 40% barley grain, 30% DDGS, and 5% feedlot supplement (DM basis). The EPE contained 38,622 U/g protease activity with negligible fibrolytic activities. The EPE was diluted with warm water and added at a rate of 0.52 g/kg DM TMR. Four animals were placed in each pen, and 6 pens allocated to each treatment (n = 6). Prior to starting the trial, all steers were adapted to the TMR for a 3-wk period. Feed was offered for ad libitum consumption once daily at 0800 h with free access to water. Feed intake was measured weekly, and individual BW of steers was recorded on 2 consecutive d at the beginning of trial and wk 4, 8, and 12. The experiment lasted 84 d, and data were analyzed using the MIXED procedure of SAS. There were no differences ($P > 0.15$) on BW gain (123 vs. 131 kg) and G:F ratio (0.141 vs. 0.148) between control and EPE treatment, respectively. Intake of DM (12.8 vs. 13.3 kg/d, $P = 0.13$) and ADG (1.75 vs. 1.96 kg/d, $P = 0.11$) tended to increase with EPE supplementation. The positive effects of supplementing EPE on DMI and ADG may have resulted from beneficial modification of ruminal fermentation by EPE. Further investigation is needed to understand if supplementing EPE influences ruminal metabolism of finishing beef steers fed DDGS at relatively high inclusion rate.

Key words: exogenous proteolytic enzyme, finishing beef steers, growth performance

W287 Effects of supplementing an exogenous proteolytic enzyme in beef finishing diets on ruminal fermentation in continuous cultures. J. M. Vera[1], T. Astuti[2], A.-H. Smith[3], D. R. ZoBell[1], and J.-S. Eun*[1], *[1]Department of Animal, Dairy, and Veterinary Sciences, Utah State University, Logan, [2]Faculty of Animal Science, Andalas University, Padang, West Sumatra, Indonesia, [3]Danisco USA, Inc., Waukesha, WI.*

We investigated whether supplementing an exogenous proteolytic enzyme (EPE) would be beneficial on in vitro ruminal fermentation characteristics when supplemented in beef finishing diets without or with dried distillers grains with solubles (DDGS). The finishing TMR consisted of 70% barley grain without DDGS (BT) or 40% barley grain and 30% DDGS (DT) on DM basis. A dual-flow continuous culture system consisting of 4 fermentors was used in a 4 × 4 Latin square designed study with dietary treatment arranged as a 2 × 2 factorial. The 4 treatments were: 1) BT without EPE; 2) BT with EPE; 3) DT without EPE; and 4) DT with EPE. Filtered ruminal contents were allowed 6 d of adaptation to the treatments followed by 3 d of data collection. The EPE contained 38,622 U/g protease activity with negligible fibrolytic activities. The EPE was diluted with warm water and added at a rate of 0.52 g/kg DM TMR. Feeding BT decreased culture pH compared with DT (6.01 vs. 5.82; $P < 0.01$), but supplementing EPE had no effect on culture pH regardless of TMR. Total VFA concentration increased by feeding DT ($P = 0.03$), but EPE supplementation had no effect on the total VFA concentration. While feeding DT increased ($P = 0.03$) or tended to increase ($P = 0.07$) acetate or propionate concentration, respectively, EPE supplementation tended to increase ($P = 0.11$) propionate concentration regardless of TMR. Methane production tended to increase ($P = 0.10$) by feeding DT compared with BT, whereas EPE supplementation increased methane production in BT, but not in DT, resulting in a TMR × EPE interaction ($P = 0.04$). The increased propionate concentration due to EPE supplementation in beef finishing diets may affect growth performance of finishing steers by providing more glucogenic precursor.

Key words: exogenous proteolytic enzyme, ruminal fermentation, continuous cultures

W288 Fecal and urinary excretion of N, P and S with increasing feeding wheat distillers dried grains with solubles (DDGS) in finishing beef heifers. Y. L. Li[1,2], C. Li*[1,3], W. Z. Yang[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, [3]College of Animal Science, Inner Mongolia Agricultural University, Hohhot, Inner Mongolia, China.*

A study was conducted to determine the fecal and urinary excretion of N, P and S with increasing inclusion of wheat DDGS in finishing diet fed to growing beef heifers. Eight ruminally fistulated Angus heifers were assigned to a replicated 4 × 4 Latin square design with treatments: control, low (25%), medium (30%) and high (35%) DDGS. 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 for ad libitum intake. Total collection of feces and urine were conducted for 5 d in each period. Intakes of N were higher ($P < 0.01$) for the DDGS diets (averaged 327 g/d) than for the control (186 g/d). Consequently, total excretion of N was greater ($P < 0.01$) for DDGS (264 g/d) than for control (164 g/d), which were primarily excreted through urine (control vs. DDGS; 104 vs. 185 g/d) and less in feces (control vs. DDGS; 60 vs. 79 g/d). Intake of P quadratically increased ($P < 0.01$) with increasing DDGS in the diets (38, 49, 49 and 43 g/d for control, low, medium and high DDGS, respectively) without affecting P retention. Fecal P excretion quadratically changed (24, 30, 29 and 23 g/d; $P < 0.05$), whereas urinary P linearly increased (3, 10, 11 and 14 g/d; $P < 0.01$) with increasing DDGS from 0 to 35% in the diets. Feeding DDGS diets increased ($P < 0.01$) S intake (control vs. DDGS; 17 vs. 42 g/d), whereas S retention was not affected (2 g/d) by diets. Increased S consumption proportionally increased urinary S excretion (53 to 80% intake) but reduced fecal S excretion (38 to 22% S intake). Results indicate that inclusion 25 to 35% wheat DDGS in finishing diets substantially increased the intakes of N and S, which were then primarily excreted through urine. Influence on intake and excretion of P were relatively small by feeding DDGS.

Key words: wheat DDGS, balance of N, P and S, beef cattle

W289 Effect of Optaflexx when fed as a topdress on performance and carcass traits of finishing steers. G. J. Vogel*, R. L. Botts, J. W. Homm, N. A. Pyatt, and G. D. Hufstedler, *Elanco Animal Health, Greenfield, IN.*

Two-thousand nine hundred forty-nine steers (581 kg) were allotted to 32 pens in a randomized complete block design of 4 treatments with 8 replications to evaluate the effects of differing methods of Optaflexx administration on growth performance. Experimental treatments included: 1) Non-medicated control (Cont); 2) Optaflexx fed continuously (200-C); 3) Optaflexx fed once daily in 0.45 kg topdress pellet (200-P); and 4) Optaflexx fed once daily in 1.8 kg of finisher ration as a topdress (200-FR). Optaflexx was fed at 200 mg hd^{-1} d^{-1} during the final 28 d before slaughter. All cattle were fed their respective basal diets twice daily at 0700 and 1300 h. The basal ration contained Rumensin at 36.7 mg/kg and Tylan at 11.2 mg/kg of the diet DM. Cattle in treatments 200-P and 200-FR were fed their respective medicated topdress, containing the entire daily dose of Optaflexx approximately 30 m after the am feeding. Data were analyzed using a mixed model with treatments fixed and blocks random. Feeding Optaflexx as a topdress resulted in similar live performance ($P > 0.21$) and carcass traits ($P > 0.22$) when compared with feeding Optaflexx continuously. Compared with control, Optaflexx increased ($P < 0.01$) daily gain 0.22 kg/d, live weight gain 6.1 kg/hd, and carcass weight 6.0 kg/hd and improved ($P < 0.01$) feed to gain 12.2%. These data indicate that feeding Optaflexx in a topdress feed once daily is equivalent to feeding Optaflexx continuously in the ration. Feeding Optaflexx increased daily gain, improved feed efficiency and increased carcass weight.

Table 1. Effect of Optaflexx fed as a topdress

	Treatments					
Item	Cont	200-C	200-P	200-FR	SEM	*P*-value
Final BW, kg	623.8[a]	630.5[b]	630.9[b]	628.4[b]	1.2	< 0.01
DM Intake, kg	9.47	9.40	9.58	9.45	0.11	0.54
Daily Gain, kg/d	1.54[a]	1.78[b]	1.79[b]	1.70[b]	0.04	< 0.01
Feed / Gain	6.17[a]	5.31[b]	5.36[b]	5.59[b]	0.11	< 0.01
Carcass weight, kg	397.2[a]	402.9[b]	403.7[b]	402.9[b]	0.6	< 0.01
Dressing percent	63.7[a]	63.9[ab]	64.0[b]	64.1[b]	0.1	0.03
Marbling score	small[02]	slight[96]	small[00]	slight[89]	2.9	0.11

[ab]Within a row, means without a common superscript differ ($P < 0.05$).

Key words: ractopamine, Optaflexx, topdress

W290 Effects of crude glycerin on in vitro gas production dry matter disappearance, VFA profiles, and composition of fermentative gasses. E. H. C. B. van Cleef*[2], S. Uwituze[1], and J. S. Drouillard[1], *[1]Kansas State University, Manhattan, [2]São Paulo State University, Jaboticabal, São Paulo, Brazil.*

Two studies were conducted to evaluate effects of glycerin on in vitro fermentation parameters and substrate DM disappearance. Ruminal fluid was collected from 4 fistulated steers fed finishing diets (90% concentrate) of rolled corn, 35% wet corn gluten feed, 20% soybean hulls, 4% supplement, 0 or 15% crude glycerin (2 steers/level), and the balance as dry-rolled corn. Buffered ruminal fluid (150 mL) was placed into 250-mL flasks equipped with pressure monitors. Substrates were added at 1.5 g DM/flask, and consisted of the same ingredient mixture fed to donor steers. The study was arranged as a 2 × 2 factorial, with factor 1 being the diet to which steers were adapted, and factor 2 being type of substrate added to cultures. Gas production, VFA profiles, and composition of head-space gas from each flask were determined after 24 h of incubation, and repeated for 2 d. Data were analyzed using the Mixed procedure of SAS. Study 2 used the same treatments, but measured DM disappearance of substrates using 50-mL in vitro tubes containing 30 mL buffered ruminal fluid and 0.5 g substrate. In study 1, there was an interaction between substrate and diet of the donor steers ($P \leq 0.01$). Differences in gas production for substrates with and without glycerin were negligible when added to cultures containing ruminal fluid from unadapted animals, but were greater for substrate with 15 compared with substrate with 0% glycerin for cultures containing ruminal fluid from steers adapted to glycerin. Prior adaptation of steers to glycerin resulted in greater methane production ($P \leq 0.01$). Adding glycerin as substrate ($P \leq 0.01$), but not as a component of donor diets ($P \geq 0.10$), increased propionate, butyrate, isobutryate, valerate, and isovalerate. In experiment 2, there was a tendency for interacation between substrate and donor steer diet ($P = 0.06$). Glycerin used in conjunction with ruminal fluid from unadapted

animals depressed digestion, but increased it when added to ruminal fluid from adapted animals. These studies suggest that prior microbial adaptation is needed to optimize fermentation of crude glycerin.

Key words: fermentation, glycerin, methane

W291 Effects of ginger root (*Zingiber officinale*) on blood oxidative stability of beef cattle. M. J. Liu*, Z. B. Yang, and W. R. Yang, *Shandong Agricultural University, Shandong, Taian, China.*

Four Lu-xi beef cattle (BW = 420 ± 20 kg) were used to evaluate the effects of different levels of ginger root (*Zingiber officinale*) on serum oxidative stability. The beef cattle were randomly allocated into individual pens and assigned to a 4 × 4 Latin square with the following feeding diets: 1) basal diet (Control), 2) Control diet + 0.5 g/kg ginger powders, 3) Control diet + 1.0 g/kg ginger powders, 4) Control diet + 1.5 g/kg ginger powders. The basal diet was formulated to meet nutrient requirement of NRC (2001). Twenty-milliliter blood samples were obtained from each cattle via jugular vein on d 1, 7 , 14, and 21, subsequently centrifuged at 3,000 r/min for 5 min, and the serum was stored in 1.5 mL Eppendorf tubes at −20°C and analyzed with Assay Kits made by Nanjing Jiancheng. The results showed that supplementation of ginger powder did not affect ($P > 0.05$) total superoxide dismutase (T-SOD) activity on d 1, but reduced ($P < 0.05$) activity on d 7 by addition of 0.5 g/kg ginger powder. Addition of ginger powder at the level up to 1.5 g/kg increased ($P < 0.05$) serum T-SOD activity. Glutathione peroxidase (GSH-Px) activity was significantly decreased ($P < 0.05$) by 0.5 g/kg ginger powder on d 7. Regardless of addition rate, ginger root reduced ($P < 0.05$) MDA content in the serum. Supplemented with ginger powders were not significantly affected ($P > 0.05$) total antioxidant capacities (T-AOC) among treatments ($P > 0.05$). Adding ginger can decline the oxidative stability in serum of beef cattle.

Key words: ginger, oxidative stability, beef cattle

W292 Oro-sensorial preferences for mixtures of protein and energetic ingredients in weaned calves. C. Montoro*[1], I. Ipharraguerre[2], and A. Bach[1,3], *[1]Ruminant Production, IRTA, Caldes de Montbui, Barcelona, Spain, [2]Lucta S.A., Montornés del Vallés, Barcelona, Spain, [3]ICREA, Barcelona, Spain.*

In previous studies with weaned calves, it was determined that soybean meal (SBM) and wheat were the preferred ingredients among 6 protein and 8 energetic ingredients, respectively. On contrary, corn gluten meal (CGM) and corn gluten feed (CGF) were the least desired. The objective of this study was to determine whether these oro-sensorial preferences remain the same when ingredients are part of a mixture. A total of 6 assays involving 60 calves (62 ± 1.3 d of age) were conducted to rank calf oro-sensorial preferences for 4 mixtures at 50%: SBM-CGF, SBM-Wheat, CGM-CGF and CGM-Wheat. To minimize potential interferences with feed texture, all ingredients were ground at 3 mm. In each assay, 20 naive calves were offered a choice ad libitum of 2 mixtures and feed consumption was recorded during 6 h. Each group of calves was used in 2 different assays, which were conducted 3 and 5 d after weaning. No calf was presented twice with the same mixture. Oro-sensorial preference was calculated as a percentage of total feed consumption ((consumption of one mixture / total consumption) x100). Preference data were subjected to one-sample comparison *t*-test using 50% as a reference value (i.e., lack of preference). The most preferred mixture was SBM-Wheat. It was preferred in all assays (Table 1). The CGF-CGM mixture was the least preferred in all assays. No differences were observed between SBM-CGF and CGM-Wheat mixtures. Results indicate that SBM and wheat are still preferred when offered as a part of a mixture. For this reason SBM and wheat could be used to improve starter acceptability by calves. On the other hand, CGF and CGM should be avoided when attempting to improve palatability of starters for calves.

Table 1. Oro-sensorial preferences of weaned calves for different mixtures (50:50%)

Mixture A	Mixture B	Oro-sensorial preferences (%)[1]	SE	*P*-values[2]
SBM-Wheat	CGM-CGF	95.7	2.66	<0.001
SBM-Wheat	CGM-Wheat	83.1	11.37	<0.001
SBM-Wheat	SBM-CGF	80.2	11.42	<0.001
SBM-CGF	CGM-CGF	81.5	5.82	<0.001
SBM-CGF	CGM-Wheat	58.6	11.34	0.130
CGM-Wheat	CGM-CGF	81.8	8.1	<0.001

[1]Percentage of consumption (Mixture A / (Mixture A + Mixture B)) x 100.

[2]Tests whether the relative consumption of mixture A differs from 50%.

Key words: palatability, preferences, intake

W293 Evaluation of cotton ginning by-product value added feed as a supplement for grazing beef cattle. J. D. Rivera*, L. W. Fitzgerald, M. L. Gipson, K. L. Odom, and R. G. Gipson, *South MS Branch Experiment Station, Poplarville, MS.*

A cotton ginning by-product (CPM) was evaluated as a supplemental feedstuff for beef cattle (n = 52, BW = 321 kg ± 15.1 kg) grazing dormant warm-season mixed grass pastures during a 70 d period in 2010. The CPM product was packaged as a 226 kg bale and is a mixture of cotton-gin trash, added protein, molasses and a complete mineral package. These bales are designed to be a self fed complete feed for pasture cattle. In this study, CPM was compared with a limit fed diet (DIET) of soybean hull pellets, dried distillers grains with solubles and a mineral package in a randomized complete design using pasture as the experimental unit. There were 4 pastures per treatment and each pasture was approximately 2.83 ha in area and consisted of dormant warm-season grass mix: bahiagrass (*Paspalum notatum*), bermudagrass (*Cynodon dactylon*), and crabgrass (*Digitaria sanguinalis*), all clipped to uniform height, and were stocked with either 6 or 7 head of predominantly English crossbred steers. Treatments were CPM fed ad libitum and DIET limit fed at the rate of 1.5% of BW and was formulated to be similar in nutrient profile to the CPM bale. At the initiation of the study, cattle were stratified by BW and assigned to pastures, and pastures were randomly allotted to treatment. Data were analyzed with PROC GLM of SAS. Pasture was the experimental unit, and means were separated using the PDFIF option. Cattle fed CPM had greater feed intake compared with cattle limit fed DIET (6.49 kg vs. 4.69 kg, respectively, $P < 0.10$). Nonetheless, cattle fed DIET had greater ADG ($P < 0.05$) compared with cattle fed CPM (0.76 kg vs 0.60 kg, respectively, $P < 0.05$). Additionally, cattle fed DIET had more efficient supplement only feed conversion ($P < 0.05$). Nonetheless, due to the by-product nature of CPM it was less expensive resulting in a cost of gain ($P > 0.10$) that was not different compared with DIET. Results of the study indicated that limit feeding a mixed ration yielded greater daily gain and efficiency, however, did not result in a greater cost of gain in cattle grazing dormant warm-season pastures.

Key words: beef cattle, supplements, pasture

W294 Influence of addition of tannins-extract in low concentration of dietary dry matter on feedlot-performance of bulls. R. Barajas*[1], B. J. Cervantes[2], A. Camacho[1], M. Verdugo[1], M. A. Espino[1], L. R. Flores[1], J. A. Romo[1], E. A. Velazquez[1], and J. J. Lomeli[1], *[1]FMVZ-Universidad Autonóma de Sinaloa, Culiacán, Sinaloa, México, [2]Ganadera Los Migueles S.A. de C.V., Culiacán, Sinaloa, México.*

A 226-d experiment was conducted to determine the influence of addition of tannins-extract in low concentration of dietary dry matter on feedlot-performance of bulls. Forty *Bos indicus* x *Bos taurus* bull-calves (184 ± SE 0.22 kg) were used. The experiment was conducted as a complete randomized block design. Bull-calves were blocked by initial weight and in groups of 5 were placed in 6 × 12 m ground floor pens. Treatments were: 1) Feedlot diets based in dry-ground corn, canola meal and dry distiller grain without additional tannins (CTRL); and 2) Diet similar to CTRL added with 0.32% (DM basis) of a tannins-extract (TE). The tannins-extract was obtained from a commercial blend that contains extracts of condensed-tannins and soluble-tannins (Silvafeed-Bypro; Silvateam-Inudor S.A., Argentina). The final weight of bull-calves fed TE treatment was 7% higher ($P = 0.04$) than CTRL (529.2 vs. 492.4 kg). Average daily gain was improved 11% ($P = 0.04$) by the inclusion of TE in the diet means were 1.37 vs. 1.53 kg/d for CTRL and TE treatments, respectively. Dry matter intake was increased 6% ($P < 0.01$) by TE (8.446 vs. 8.994 kg/d). Feed efficiency was not affected by treatments ($P > 0.15$). Bull-calves that received TE showed a tendency ($P = 0.10$) for best using of dietary NEm, Net energy observed/expected ratio were 0.93 and 0.98 for CTRL and TE, respectively. Hot carcass weight was improved ($P = 0.05$) by TE addition (313.1 vs. 338.6 kg for CTRL and TE, respectively). In blood samples taken at 161-d PUN was 15% lower ($P < 0.01$) in bulls fed tannins (12.79 vs. 10.85 mg/dL for CTRL and TE, respectively). It is concluded, that 0.3% (DM basis) of extract tannins-supplementation in the diet improves feedlot performance of bull-calves.

Key words: feedlot-performance, bull-calves, tannins

W295 Influence of addition of tannins-extract in low concentration of dietary dry matter on carcass characteristics of bull-calves. A. Camacho*[1], B. J. Cervantes[2], M. A. Espino[1], M. Verdugo[1], L. R. Flores[1], J. A. Romo[1], and R. Barajas[1], *[1]FMVZ-Universidad Autonóma de Sinaloa, Culiacán, Sinaloa, México, [2]Ganadera Los Migueles S.A. de C.V., Culiacán, Sinaloa, México.*

Forty *Bos indicus* x *Bos taurus* bull-calves (184 ± 0.22 kg SE) were used to determine the influence of tannins-extract addition in low concentration to dietary dry matter on carcass characteristics of bull-calves. The experiment was conducted as a complete randomized block design. Bull-calves were blocked by initial weight and located in groups of 5 in ground floor pens (6 × 12 m). Treatments were: 1) Feedlot diets based in dry-ground corn, canola meal and dry distilled grain without additional tannins (CTRL); 2) Feeding with a diet similar to CTRL added with the 0.32% (DM basis) of a tannins-extract (TE) from condensed and soluble tannins blend (Silvafeed-Bypro; Silvateam-Inudor S.A., Argentina), along the complete feedlot experiment. Upon the complete feedlot period, animals were sacrificed and carcass weight was measured. Carcasses were chilled during 24 h (0°C), and left half of carcass was cross-sectioned between 12th and 13th ribs to determine carcass traits. Hot carcass weight was improved ($P = 0.05$) by TE addition (313.1 vs. 338.6 kg for CTRL and TE, respectively). Carcass dressing (63.8 ± SE 0.38%) was not affected by treatments ($P = 0.18$). Rib eye area was enhanced ($P = 0.03$) by TE with means of 77.4 and 85.6 cm2 for CTRL and TE, respectively. Adjusted rib eye area (using final weight as co-variable) tended to be higher ($P = 0.09$) in carcass of cattle fed TE (minimum-squares means 79.4 vs. 82.8 cm2 for CTRL and TE, respectively). Back fat thickness (9.2 ± SE 0.54 mm) and KPH-fat (1.9 ± SE 0.11%) were similar between treatments ($P > 0.20$). Meat pH (6.23 ± SE 0.04) was not influenced by treatments ($P > 0.20$). It is concluded that, the addition of a tannins-extract in low concentration of dietary dry matter, enhanced carcass weight and rib eye area without affecting remainder traits of bull-calves carcass.

Key words: carcass-characteristics, bull-calves, tannins

W296 Effect of length feeding additional tannins-extract on feedlot-performance of finishing-bulls. R. Barajas*[1], B. J. Cervantes[2], S. C. Arechiga[1], M. A. Espino[1], L. R. Flores[1], A. Camacho[1], and J. A. Romo[1], *[1]FMVZ-Universidad Autonóma de Sinaloa, Culiacán, Sinaloa, México, [2]Ganadera Los Migueles S.A. de C.V., Culiacán, Sinaloa, México.*

Sixty *Bos indicus* x *Bos taurus* bulls (366 ± 0.39 kg) were used to determine the effect of length feeding additional tannins-extract on feedlot-performance of finishing-bulls. The experiment was conducted as a complete randomized block design. Animals were blocked by initial weight and allotted in groups of 5 in ground floor pens (6 × 12 m). Treatments were: 1) Feeding with a DDG-ground corn based 96% concentrate-finishing diet (12.6% CP, 2.052 Mcal of NEm/kg) without additional tannins during 98 d-complete finishing period (CTRL); 2) Diet similar to CTRL added with the equivalent of 0.32% DM of a tannins-extract (TE) of condensed and soluble tannins blend (Silvafeed-Bypro; Silvateam-Inudor S.A., Argentina), during first 67 d (68%) of finishing period (TE68); and 3) Diet similar to CTRL added with the equivalent of 0.32% DM of a TE during 98 d (100%) of complete finishing period (TE100). Final weight was increased linearly ($P < 0.01$) as length feeding TE was augmented (497.7, 507.1, and 512.6 kg for CTRL, TE68, and TE100, respectively). Average daily gain was increased linearly ($P = 0.02$) as time feeding TE was increasing with means of 1.345, 1.452, and 1.500 kg/day for CTRL, TE68, and TE100, respectively. DMI was not affected by treatments ($P > 0.30$). Gain/DMI ratio was increased linearly ($P < 0.01$) with the increment in days feeding TE (0.145, 0.153, and 0.160 kg gain/kg DMI for treatments CTRL, TE68, and TE100, respectively). Hot carcass weight increased linearly ($P = 0.02$) with the increment in days feeding TE (309.2, 316.4, and 320.1 kg for treatments CTRL, TE68, and TE100, respectively). TE intake reduced ($P = 0.04$) plasma urea nitrogen of bulls relative to no tannins treatment (6.06 vs. 5.25 mg/dL). It is concluded, that as increased the length of feeding additional tannins-extract, improves the feedlot performance of finishing-bulls.

Key words: feedlot-performance, finishing-bulls, tannins

W297 Effect of length feeding additional tannins-extract on carcass traits of finishing-bulls. S. C. Arechiga*[1], B. J. Cervantes[2], M. A. Espino[1], L. R. Flores[1], A. Camacho[1], J. A. Romo[1], and R. Barajas[1], *[1]FMVZ-Universidad Autonóma de Sinaloa, Culiacán, Sinaloa, México, [2]Ganadera Los Migueles S.A. de C.V., Culiacán, Sinaloa, México.*

Sixty *Bos indicus* x *Bos taurus* bulls (366 ± 0.39 kg) were used to determine the effect of length feeding additional tannins-extract on carcass traits of finishing-bulls. The experiment was conducted as a complete randomized block design. Treatments were: 1) Feeding with a DDG-ground corn based 96% concentrate-finishing diet (12.6% CP, 2.052 Mcal of NEm/kg) without additional tannins during 98 d-com-

plete finishing period (CTRL); 2) Diet similar to CTRL added with 0.32% (DM basis) of a tannins-extract (TE) during first 67 d (68%) of the finishing period (TE68); and 3) Diet similar to CTRL added with 0.32% (DM basis) of a TE during 98 d (100%) of the complete finishing period (TE100). TE was supplied as a condensed and soluble tannins extract-blend (Silvafeed-Bypro; Silvateam-Inudor S.A., Argentina). Hot carcass weight increased linearly ($P = 0.02$) with the increment in days feeding TE (309, 316, and 320 kg for treatments CTRL, TE68, and TE100, respectively). Rib eye area was higher ($P = 0.09$) in bulls fed tannins-extract relative to no TE fed-bulls (69.7 vs. 75.6 cm2). Back fat thickness was 13.7% lower ($P = 0.05$) in bulls consuming TE along the complete finishing period (TE100) in relationship to CTRL-bulls that did not received TE. Back fat thickness was decreasing linearly ($P = 0.05$) as time-length in TE was increasing, means were of 10.7, 10.1, and 9.3 mm for CTRL, TE68, and TE100, respectively. KPH values were decreasing linearly ($P = 0.06$) as time-length feeding tannins was augmenting, means were 2.1, 1.9, and 1.6% of carcass weight for CTRL, TE68, and TE100, respectively. Marbling score and muscle pH were not affected by treatments ($P > 0.20$). It is concluded, that feeding tannins-extract along complete finishing period increases carcass weight and decreases fat content in carcass of feedlot-bulls.

Key words: carcass traits, finishing-bulls, tannins

W298 Meta-analysis of the effects of the interaction between copper and molybdenum on weight gain and gain:feed ratio in growing cattle. R. Dias*[1], S. Lopez[2], Y. Montanholi[1], B. Smith[1], L. Haas[1], S. Miller[1], and J. France[1], *[1]University of Guelph, Guelph, Ontario, Canada, [2]Instituto de Ganadería de Montaña (IGM), Universidad de León, León, Spain.*

Copper and molybdenum are essential trace minerals for proper functioning of many biological systems in ruminants. A variety of disease conditions are caused by lack of copper in the feed or by excesses of other minerals such as molybdenum which bind to copper and make it unavailable. Adequate trace mineral supply favors animal performance by improving weight gain and feed efficiency. A meta-analysis was undertaken to summarize and evaluate available data relating to the effects of copper and molybdenum supplementation on weight gain and gain:feed ratio in growing cattle weighing between 120 and 320 kg using 22 studies. The mixed model was applied by considering each study as a random effect. The standard error of weight gain and gain:feed ratio were recorded to give a distinct weight for each study. According to the first model, the interaction between supplementation of copper and molybdenum together, and molybdenum supplemented individually are more influential ($P < 0.05$) to weight gain in growing cattle than copper supplemented individually and DM intake ($P > 0.05$). In contrast, the second model showed that gain:feed ratio was significantly affected by DM intake, copper and molybdenum supplemented individually in the diet, and the interaction between these minerals ($P < 0.05$). The level of copper in plasma and the effects of copper source and animal sex were not significant with either model ($P > 0.05$). The first model indicated that the negative effect of possible excessive molybdenum supplementation on weight gain is more relevant than the effect of copper supplementation. Interaction between copper and molybdenum seems to favor weight gain due to copper neutralizing the negative effect of molybdenum on this parameter. In the second model, gain:feed ratio was negatively affected by copper and molybdenum supplemented individually, but these minerals together favored the gain:feed ratio. The interactions between copper and molybdenum needs to be considered carefully when supplementing these trace minerals individually in diets for growing cattle.

Key words: copper, molybdenum, growing cattle

W299 Effects of restricted versus conventional dietary adaptation over periods of 14 and 21 days on rumen papillae of feedlot Nellore cattle. F. S. Parra[1,3], J. R. Ronchesel[1], M. D. B. Arrigoni[1], C. L. Martins[1], D. D. Millen*[2], R. D. L. Pacheco[1], R. S. Barducci[1], L. M. N. Sarti[1], L. C. Vieira Júnior[1], M. C. S. Franzói[1], R. Espigolan[1], J. M. P. Silva[1], D. Setten[1], F. P. Luiz[1], E. A. Chacon Filho[1], *[1]São Paulo State University (UNESP), Botucatu, São Paulo, Brazil, [2]São Paulo State University (UNESP), Dracena, São Paulo, Brazil, [3]Supported by FAPESP, São Paulo, São Paulo, Brazil.*

This study, conducted at the São Paulo State University feedlot, Botucatu Campus, Brazil, was designed to determine effects of restricting DMI of the final finishing diet (REST) as a means of dietary adaptation compared with diets increasing in concentrate (STEPUP) over periods of 14-d and 21-d on rumen wall absorptive surface area (RASA) of feedlot Nellore cattle. The experiment was designed as a completely randomized block with a 2 × 2 factorial arrangement with repeated measures over time, replicated 6 times (5 bullocks/pen), in which 120 18-mo-old yearling Nellore bulls (372.2 ± 21.5 kg) were fed in 24 pens for 84-d according to the treatments: STEPUP for 14-d and 21-d, REST for 14-d and 21-d. The STEPUP program consisted of ad libitum feeding of 3 adaptation diets over periods of 14-d or 21-d with concentrate level increasing from 55% to 85% of diet DM. The REST program consisted of restricted DMI of the final diet with programmed increases in feed offered until animals reached ad libitum access over periods of 14-d or 21-d. After adaptation one animal per pen was slaughtered for rumen papillae evaluations. The remaining 96 animals were harvested when achieved about 500 kg of BW. At harvest a 1-cm^2 fragment of each rumen was collected from ventral sac. Manually, the number of papillae per cm^2 of rumen wall (NOP) was determined and 12 papillae were randomly collected from each fragment; scanned, and mean papillae area (MPA) in cm^2 was measured by software for image analysis. RASA in cm^2 was calculated as follows: 1 + (NOP*MPA) – (NOP*0.002). No significant ($P > 0.10$) protocols or days main effects were observed for MPA and NOP. Animals in STEPUP protocol had greater ($P < 0.05$) RASA (24.98 vs. 20.52) than animals in REST protocol. A significant ($P < 0.05$) interaction was observed between days and harvesting dates. Animals adapted for 14-d had reduced RASA after adaptation than: 1) after finishing (16.20 vs. 25.58) and, 2) animals adapted for 21-d after adaptation (16.20 vs. 27.78). The STEPUP protocol and 21-d of adaptation led to greater RASA, which could indicate lesser extent of rumen lesions.

Key words: Zebu, papillae

W300 Feedlot performance and carcass traits of yearling bulls fed polyclonal antibody preparations, yeast or monensin. E. Rodrigues[1,3], F. S. Parra[1], M. D. B. Arrigoni[1], C. L. Martins[1], D. D. Millen*[2], R. D. L. Pacheco[1], C. R. M. Andrade[1], R. S. Barducci[1], L. M. N. Sarti[1], J. R. Ronchesel[1], A. L. Campanini[1], and D. Tomazella[1], *[1]São Paulo State University (UNESP), Botucatu, São Paulo, Brazil, [2]São Paulo State University (UNESP), Dracena, São Paulo, Brazil, [3]Supported by FAPESP, São Paulo, São Paulo, Brazil.*

This study, conducted at the São Paulo State University feedlot, Botucatu Campus, Brazil, was designed to test the effects of polyclonal antibody preparation (PAP) against lactate-producing rumen bacteria,

Saccharomyces cerevisiae yeast (YEA) or monensin (MO) on feedlot performance and carcass traits of Nellore yearling bulls fed high concentrate diets for 112-d. One-hundred 20-mo-old bullocks (323.3 ± 21.8 kg) were assigned to 25 pens (4 bullocks/pen) and used in a completely randomized design with a 2 × 2 + 1 factorial arrangement of treatments, replicated 5 times. Factors were inclusion or not of PAP or YEA, both at a dose of 450 mg•kg^{-1} of DM, and the additional treatment was MO at 30 mg•kg^{-1} of DM. Dunnett test was used to compare MO with other treatments. Yearling bulls were weighed every 28-d to calculate ADG and F:G ratio, and DMI was recorded every day. No significant ($P > 0.10$) MO effect was observed for DMI in kg from 0-d to 112-d, however feeding MO reduced ($P < 0.05$) DMI in % of BW from 0-d to 28-d when compared with the other treatments (2.19% vs. 2.29%). Feeding MO from 0-d to 112-d reduced ($P < 0.05$) cost to gain 1 kg of BW (CBW; $2.62 vs. $2.79) and led to greater ($P < 0.05$) amount of kidney-pelvic fat (4.74 kg vs. 4.15 kg) when compared with the other treatments. A significant ($P < 0.05$) YEA main effect was observed for ADG, F:G ratio, CBW and HCW. Feeding YEA from 0-d to 112-d reduced ADG (1.13 kg vs. 1.24 kg), and led to greater F:G ratio (7.16 vs. 6.74) and CBW ($2.88 vs. $2.82) and lighter HCW (252.77 kg vs. 258.46 kg). No significant ($P > 0.10$) PAP main effect was observed for any of the feedlot performance parameters analyzed throughout the study. In addition, no significant ($P > 0.10$) differences between PAP and MO were detected in terms of feedlot performance (ADG, DMI, F:G ratio and CBW) and carcass traits (HCW and dressing percentage) from 0-d to 112-d. Yearling bulls not fed YEA performed better than those animals fed YEA. Feeding PAP did not affect negatively feedlot performance and carcass traits. Thus, the potential of PAP to replace ionophores, such as MO, should be further investigated.

Key words: Nellore, PAP, yeast

W301 Rumen papillae alterations of feedlot yearling bulls fed polyclonal antibody preparations, yeast or monensin. E. Rodrigues[1,3], F. S. Parra[1], M. D. B. Arrigoni[1], C. L. Martins[1], D. D. Millen*[2], R. D. L. Pacheco[1], R. S. Barducci[1], L. M. N. Sarti[1], J. R. Ronchesel[1], C. R. M. Andrade[1], A. L. Campanini[1], and D. Tomazella[1], *[1]São Paulo State University (UNESP), Botucatu, São Paulo, Brazil, [2]São Paulo State University (UNESP), Dracena, São Paulo, Brazil, [3]Supported by FAPESP, São Paulo, São Paulo, Brazil.*

This study, conducted at the São Paulo State University feedlot, Botucatu Campus, Brazil, was designed to test the effects of polyclonal antibody preparation (PAP) against lactate-producing rumen bacteria, *Saccharomyces cerevisiae* yeast (YEA) or monensin (MO) on rumen papillae alterations of Nellore yearling bulls fed high concentrate diets for 112-d. One-hundred 20-mo-old bullocks (323.3 ± 21.8 kg) were assigned to 25 pens (4 bullocks/pen) and used in a completely randomized design with a 2 × 2 + 1 factorial arrangement of treatments, replicated 5 times. Factors were inclusion or not of PAP or YEA, both at a dose of 450 mg•kg^{-1} of DM, and the additional treatment was MO at 30 mg•kg^{-1} of DM. At harvest rumenitis incidence (RUM) was determined, on the entire washed rumen, using a scale of 0 (no lesions noted) to 10 (severe ulcerative RUM). A fragment of 1 cm^2 of each rumen was collected from ventral sac. Manually, the number of papillae per cm^2 of rumen wall (NOP) was determined and 12 papillae were randomly collected from each fragment; scanned, and mean papillae area (MPA) in cm^2 was measured using software for image analysis. Rumen wall absorptive surface area (RASA) in cm^2 was calculated as follows: 1 + (NOP*MPA) – (NOP*0.002). A significant ($P < 0.05$) PAP main effect was observed for RUM, NOP and RASA. Yearling bulls fed PAP presented lesser RUM (1.38 vs. 1.77) and greater NOP (56.42 vs. 44.45) and RASA (21.10 cm^2 vs. 17.30 cm^2) than those animals not fed PAP. Feeding YEA led to smaller ($P < 0.05$) MPA (0.36 cm^2 vs. 0.44 cm^2) and reduced ($P < 0.05$) NOP (48.05 vs. 52.66) and RASA (17.39 cm^2 vs. 21.02 cm^2). Feeding MON led to greater ($P < 0.05$) RASA (25.82 cm^2 vs. 15.99 cm^2) and NOP (57.98 vs. 43.20) when compared with animals fed YEA, but no significant ($P > 0.10$) differences were observed when compared with animals fed PAP. Yearling bulls not fed YEA presented greater development of ruminal epithelia than those animals fed YEA. Feeding PAP reduced RUM and led to greater development of ruminal epithelia. Thus, PAP presents a new technology to control rumen acidification with the potential to replace ionophores, such as MO.

Key words: Nellore, PAP, yeast

W302 Fatty acid profiles in adipose tissue of grazing and feedlot beef steers. C. T. Noviandi*[1], R. E. Ward[2], J.-S. Eun[1], D. R. ZoBell[1], R. D. Stott[1], T. Astuti[3], B. L. Waldron[4], and M. D. Peel[4], *[1]Department of Animal, Dairy, and Veterinary Sciences, [2]Department of Nutrition, Dietetics, and Food Sciences, Utah State University, Logan, [3]Faculty of Animal Science, Andalas University, Padang, West Sumatra, Indonesia, [4]Forage and Range Research Laboratory, USDA-ARS, Logan, UT.*

A livestock study was conducted to evaluate the effects of pasture finishing vs. feedlot finishing beef steers on subcutaneous adipose tissue fatty acid (FA) composition. Twenty-seven Angus crossbred steers were arranged on the following 3 treatments: grazing on tall fescue without N fertilizer (TF–NF), grazing on tall fescue with N fertilizer (TF+NF), and feeding TMR on feedlot (FLT). A total of 168 kg/ha N fertilizer was applied in 3 split applications of 56 kg/ha to the TF+NF. The treatments were arranged in a randomized complete block design with 3 replicates and 3 steers per replicate. The pasture-finished steers grazed on replicated 0.47-ha paddocks from May through September 2010 for total of 16 wk. The steers on FLT were housed in 3 group pens with 3 animals per pen and fed a typical finishing diet containing 83% barley grain. Adipose tissue biopsies were obtained on wk 4, 12, and 16. There were no effects of time and treatment × time interaction on FA composition ($P > 0.10$). Fertilizing N did not affect FA composition, except for C18:1 trans-11 being higher in TF+NF compared with TF–NF ($P = 0.03$). Concentration of C18:2 cis-9, cis-12 tended to increase ($P = 0.09$) in TF–NF compared with TF+NF. Concentrations of C18:3 cis-9, cis-12, cis-15 and C18:2 cis-9, trans-11 were higher in grazing steers compared with those in FLT (0.41 vs. 0.20 and 0.48 vs. 0.25 g/100 g FA, respectively; $P < 0.01$), whereas concentrations of C18:1 cis-9 and C18:1 cis-11 were higher in FLT than grazing treatments. Overall results from this study indicate that 4 wk of grazing resulted in remarkable changes in adipose tissue FA profiles in beef steers, but N fertilization had minor impacts on the FA composition. Grazing beef steers elicited increases in human beneficial FA concentrations compared with steers fed FLT.

Key words: fatty acids, feedlot finishing diet, grazing beef steers

W303 Chromium propionate supplementation on feedlot performance of bulls. M. A. Espino*[1], B. J. Cervantes[2], P. W. Rounds[3], F. Valdez[3], E. A. Velazquez[1], J. A. Romo[1], and R. Barajas[1], *[1]FMVZ-Universidad Autonóma de Sinaloa, Culiacán, Sinaloa, México, [2]Ganadera Los Migueles S.A. de C.V., Culiacán, Sinaloa, México, [3]Kemin Agrifoods, Des Moines, IA.*

With the objective of determine the influence of chromium propionate supplementation on feedlot performance of bulls, a 189 d experiment was conducted. Forty 5 bulls 228 ± 2.84 kg were used. Animals were blocked by initial weight and in groups of 5 were located in ground floor pens (6 × 12 m). The experiment was conducted as a complete randomized block design (CRBD). Treatments were: 1) Feedlot diets without additional chromium (CTRL); 2) Diets added with an equivalent of 0.15 ppm of chromium as Cr-propionate (Cr15); and 3) Diets added with an equivalent of 0.30 ppm of chromium as Cr-propionate (Cr30). Supplementary chromium was provided from Kemin Trace Cr premix (Kemin Agrifoods, Des Moines, IA). The experiment was analyzed by ANOVA for CRBD; CTRL vs. Cr-supplemented diets (Cr15 + Cr30) was compared by orthogonal contrasts; and quadratic trend was explored using polynomial contrasts. In a 189-d experiment, bulls receiving any additional Cr-level were 5% heavier than CTRL (P = 0.03). Ending weight showed a quadratic trend (P = 0.11) toward Cr-level; Cr15-bulls were the heaviest with values of 469.8, 495.9, and 492.2 kg for CTRL, Cr15, and Cr30 treatments, respectively. Average daily gain was improved 10.8% by supplementary Cr compared with CTRL (P = 0.03). Weight gain had a quadratic response to additional Cr-level (P = 0.05), with values of 1.27, 1.42, and 1.40 kg/d for CTRL, Cr15, and Cr30 treatments, respectively; the highest ADG was observed in bulls fed with 0.15 ppm additional Cr. DMI and gain/feed ratio were not affected by treatments (P > 0.20). Cr15 treatment, improved 5.2% hot carcass weight (P = 0.09) comparative to CTRL; carcass weight of Cr30-fed cattle was no different from remainder treatments (P > 0.20). Carcass traits and meat pH were similar across all treatments (P > 0.20). It is concluded, that chromium propionate supplementation improves feedlot performance of bulls, and dosage of 0.15 ppm would result in better response against not Cr addition or 0.30 ppm Cr supplementation

Key words: bulls, chromium, feedlot performance

W304 Creatinine to estimate the quantity of carcass muscle and crude protein in the empty body weight. L. F. Costa e Silva, S. de C. Valadares Filho, P. P. Rotta*, R. F. D. Valadares, and D. Zanetti, *Universidade Federal de Viçosa, Viçosa, Minas Gerais, Brazil.*

The creatinine production is due the protein turnover that occurs in animal muscle. It is possible to determine the muscle and crude protein quantity in carcass and the crude protein quantity in the empty body by the urinary creatinine excretion. The aim of this study was to estimate the urinary creatinine excretion by the body weight (BW) and the muscle quantity in carcass and crude protein quantity in carcass and in the empty body by the urinary creatinine excretion. 32 Nellore bulls with initial body weight of 259 kg and 14 mo were used in this experiment. Four bulls were fed at maintenance and the 28 animals were kept at ad libitum system with corn silage and 40% of diet with concentrate in dry matter. The animals were allocated in 4 groups, which each group was slaughtered in different times of feedlot (42, 84, 126 and 168 d). To estimate the urinary creatinine excretion, 14 animals were kept at Tie Stall system. The others animals were allocated at collective pens with electronic gates to evaluate the individual feed intake. Before each slaughter, collections of urine were realized during 3 consecutive days. From the slaughters the empty body weight and the body composition of the animals were determined. After the slaughter, the left carcass was separated in muscle, fat and bone. The carcass samples were dried and ground to determine the total nitrogen. In urine, the creatinine analyses followed the protocol to high performance liquid chromatography. The creatinine excretion (Y) can be obtained by the equation: $Y = 0.0276 \times BW^{0.9811}$, $r^2 = 0.9761$. The quantity of carcass muscle (Mcarc) and carcass crude protein (CPcarc) estimated by the creatinine (CRE) were: $Mcarc = 15.307 \times CRE^{0.9894}$, $r^2 = 0.9341$ and $CPcarc = 3.2756 \times CRE^{1.0683}$, $r^2 = 0.9312$. The crude protein in empty body weight (CPEBW), estimated by the CRE was: $CPEBW = 6.5563 \times CRE^{0.9502}$, $r^2 = 0.9427$. All the exponents of the equations were near from 1. It allows concluding that the urinary creatinine excretion and the quantity of carcass muscle and carcass and empty body crude protein present near relation.

Key words: excretion, turnover, urine

W305 Effect of glycerin on intake and digestion of bermudagrass hay in beef cattle. T. A. Wickersham*, K. M. Bodensteiner, M. L. Drewery, R. O. Dittmar, and J. E. Sawyer, *Texas A&M University, College Station.*

Glycerin is a byproduct of biodiesel production and has the potential to provide supplemental energy to cattle consuming forage diets; however, the effect of glycerin in these diets has not been determined. Our objective was to determine the effects of increasing levels of glycerin on bermudagrass hay utilization. Four Angus × Hereford steers (BW = 301 ± 18.5 kg) were used in a 3 × 3 Latin square with an additional column for steer. Steers were provided ad libitum access to bermudagrass hay (10.6% CP and 69.0% NDF) and supplemented with cottonseed meal (0.2% of BW per day; 42.5% CP). Treatments consisted of 3 levels of glycerin infusion (0, 0.1, and 0.2% BW). Glycerin was delivered directly into the rumen once daily. Experimental periods were 17d long. Intake was determined from d 11 through 14 to correspond with fecal grab samples collected from d 12 to d 15. Acid detergent insoluble ash was used as an internal marker to estimate fecal production. On d 16 of each period, ruminal fermentation profiles were evaluated. Increasing levels of glycerin resulted in a quadratic (P = 0.04) response in hay OM intake from 6.75 kg/d for 0% glycerin to 5.92 and 6.46 kg/d for 0.1 and 0.2% BW as glycerin, respectively. There was a correspondent quadratic (P = 0.05) response in total OM intake to glycerin provision (7.25, 6.72, and 7.56 kg/d for 0, 0.1, and 0.2%). However, there was no significant (P > 0.12) effect of glycerin on either OM digestion (54.2, 55.6, and 51.5% for 0, 0.1, and 0.2%, respectively) or NDF digestion. When measures of intake and digestion were combined as total digestible OM intake, there was no significant effect (P > 0.35) of increasing glycerin. Intake of total digestible OM was 3.95, 3.74, and 3.92 kg/d for 0, 0.1, and 0.2%. A treatment by time interaction (P = 0.03) occurred for ruminal pH. Increasing glycerin resulted in greater reductions in ruminal pH post feeding; however, all pH values were greater than 6.30. Further work is required to understand why glycerin negatively affected forage intake when provided at 0.1% of BW.

Key words: forage, glycerin, cattle

W306 Effect of methanol on intake and digestion in beef cattle. K. N. Winsco*, N. M. Kenney, R. O. Dittmar, J. A. Coverdale, J. E. Sawyer, and T. A. Wickersham, *Texas A&M University, College Station.*

Methanol is used in biodiesel production, is found in significant quantities in crude glycerin, and has adverse effects on non-ruminants. Currently, the maximum concentration allowed for methanol in ruminant feeds is 150 ppm, but there is little data describing the effects of methanol concentrations in excess of 150 ppm on ruminants. Our objective was to determine effects of methanol concentration on intake and digestion in cattle consuming a grain-based diet. Five ruminally cannulated Holstein steers (BW = 399 ± 34 kg) were used in a 4 × 4

Latin square with an additional column for steer, and provided ad libitum access to a grain-based diet (49% corn, 14.7% CP, 32.1% starch). Treatments consisted of 4 levels of methanol (0, 70, 140, and 210 g/d) infused directly into the rumen to prevent volatilization from feed. Experimental periods were 16 d, with 9 d of adaptation to treatment and 7 d of data collection. Determinations of intake were made on d 10 through 14 of each period to correspond with fecal grab samples collected from d 11 through 15. Titanium dioxide, dosed daily at 10 g/d, was used as an external marker to estimate fecal production. Ruminal fluid was collected on d 16. Methanol intake increased linearly ($P < 0.01$) from 0 to 6,563, 13,356, and 19,831 ppm diet for 0, 70, 140, and 210 g/d of methanol, respectively. Intake was not ($P > 0.71$) affected by methanol infusion (9.93, 9.93, 9.73, and 9.83 kg OM/d for 0, 70, 140, and 210 g/d of methanol). Methanol infusion did not affect ($P > 0.12$) OM or starch total tract digestion, which averaged 75.6 and 93.9%, respectively, across treatments. Our results indicate that levels of methanol consumption in excess of the current recommendation of 150 ppm did not have adverse effects on intake and digestion in cattle. These data suggest minimal risk in allowing ruminant diets to contain greater levels of methanol than non-ruminant diets.

Key words: methanol, glycerin, cattle

W307 Effects of purified lignin on growth performance of feedlot cattle. Y. Wang*[1], J. H. Lora[2], and T. A. McAllister[1], *[1]Agriculture and Agri-Food Canada, Lethbridge Research Centre, Lethbridge, Alberta, Canada, [2]GreenValue Enterprises LLC, Media, PA.*

A feedlot experiment was conducted to assess the effect of purified lignin recovered from wheat straw soda pulping (PL) on the growth performance of feedlot cattle. A total of 60 Hereford-Angus cross weaned calves were randomly divided into 4 groups. The cattle were individually fed a barley grain/barley silage based total mixed ration and randomly assigned to one of 4 diets containing increasing levels of PL (0, 4, 8 and 16 g/kg DM). Cattle were fed once daily for ad libitum intake and had free access to water during a 70-d growing period and a 121-d finishing period. Inclusion of PL in the diet tended to linearly reduce ($P = 0.090$) average daily gain (ADG) during the growing period, but not in the finishing period. Feed intake over the entire experimental period tended to be linearly reduced ($P = 0.100$). Feed efficiency was similar among groups of steers during growing period, but was quadratically improved ($P = 0.059$) during the finishing period with increasing PL in the diet. Supplementation of PL tended to increase ($P = 0.098$) the saleable meat yield, but had no effects on other carcass traits. The quadratic improvement in feed efficiency by adding PL to finishing diet (high grain diet) but not to growing diet is likely due to PL regulating ruminal microbial activity in digestion of starch, as well as modulation of the feed intake. Inclusion of PL at the level of about 8 g/kg DM in diet containing high grain may benefit the feedlot cattle in terms of improving feed efficiency.

Key words: feedlot cattle, purified lignin, growth