

Ruminant Nutrition: Feedlot

T315 Fatty acid profiles and meat quality of steers finished in feedlot or on pasture. H. O. Patino^{*1}, F. S. Medeiros¹, K. C. Swanson², and M. A. Sierra¹, ¹Dep. Zootecnia, UFRGS, Porto Alegre, RS, Brazil, ²Dept. Animal and Poultry Science, University of Guelph, Guelph, ON, Canada.

Thirty crossbreed steers were used in a completely randomized design to evaluate the effect of different feeding systems on the performance, meat quality and fatty acid profile of intramuscular fat. The experimental treatments were levels of feeding (0, 0.4, 0.8 and 1.2% BW) of a corn based supplement in a winter pasture of annual ryegrass (*Lolium multiflorum* L) and oats (*Avena strigosa* Schreb), or a feedlot, using a 50:50 concentrate/silage diet. Steers were slaughtered at 24 months of age at similar levels of subcutaneous fat (ultrasound evaluation). No differences were observed in tenderness (3.15 kg/cm²), marbling (5.72 points), pH (5.64), Color L* (36.84), Color b* (12.89) and in cooking (14.34%) and drip losses (4.33%) in the *Longissimus dorsi* samples (p>0.05). The level of lipids in meat of steers finished in feedlot was 29% greater than steers supplemented on pasture (13.28 vs 9.38%; p<0.01). Supplementation level did not influence lipid concentration (p>0.05). Concentrations of myristic, palmitic, stearic and linoleic acid did not differ among treatments averaging 3.08, 25.80, 20.15 and 1.87%, respectively (p>0.05). Supplementation up to the level of 0.8% BW increased CLA (0.473%) and linolenic (0.798%) FA levels in the intramuscular fat, in relation to the highest level of supplementation and the feedlot, which didn't differ from each other, with average levels of CLA and linolenic acid of 0.292 and 0.600, respectively (p<0.05). Treatments on pasture had higher n-3 FA compared to feedlot (p<0.05) but didn't differ in the content of n-6 FA (p>0.05), producing lower n-6:n-3 of 1.89, 2.31, 2.50 and 2.89 for the levels of supplementation compared to feedlot (4.11; p<0.05). Supplementation level linearly reduced n-3 FA and CLA and linearly increased n-6:n-3 (P<0.05). Fattening animals on winter pastures using increasing levels of energy supplementation doesn't result in differences in meat quality but results in changes in FA profile.

Key Words: winter pasture, feedlot, energy supplementation

T316 Nutrient digestibilities of Holstein steers fed diets containing different levels of nonforage fiber in a low forage diet. M. Mojtahedi, M. Danesh Mesgaran^{*}, A. R. Heravi Moussavi, and A. Tahmasbi, *Ferdowsi University of Mashhad, Mashhad, Khorasan Razavi, Iran.*

The aim of this study was to investigate the effect of diets containing barley grain and/or dried sugar beet pulp (SBP) on total tract apparent nutrient digestibilities in Holstein steers. Four Holstein steers with initial body weight of 368±8 kg fitted with ruminal fistulae were used in a 4×4 Latin square design (28 days of each period). Basal experimental diet consisted of 15% corn silage, 20% alfalfa hay, 33% barley grain, 17% soybean meal, 13.8% wheat bran, 0.5% calcium carbonate, 0.2% salt, and 0.5% mineral and vitamin premix on dry matter basis. Barley grain was substituted with SBP as 0.0%, 33%, 66% or 100% (SBP0, SBP33, SBP66, and SBP100, respectively). Steers were fed 9.5 kg of diet DM as total mixed ration twice daily at 0800 and 1600 h. Fecal samples were collected during the last 7 d of each period. Acid insoluble ash (AIA) was used as an internal marker to determine the digestibility. Data were analyzed using the mixed model procedure of SAS (Y = Mean + Treatment + Animal + Period + Residual) and the means compared by the Duncan test (P< 0.05). Results are presented in table 1. Apparent total tract digestibility coefficients for dry matter (DM) and neutral detergent fiber (NDF) increased by inclusion of SBP in the diet (p< 0.05), but

was similar for SBP0 and SBP100 (p> 0.05). Total tract digestibility of organic matter (OM), crude protein (CP) and acid detergent fiber (ADF) were not different among treatments (p> 0.05). Results from this study suggested that the substituting SBP at low and medium inclusion rates can improve diet DM and NDF digestibility in Holstein steers fed high level of concentrate.

Table 1. Effects of substitution of sugar beet pulp for barley grain on total tract nutrient digestibility.

Items	SBP0	SBP33	SBP66	SBP100	SEM	P
Treatments †						
Apparent digestibility (g/Kg)						
DM	696.0 ^b	717.0 ^a	722.0 ^a	709.0 ^{ab}	5.2	0.03
OM	779.5	781.7	773.2	772.5	6.4	0.68
CP	730.0	740.2	723.0	726.5	11.2	0.72
NDF	611.2 ^b	634.2 ^a	636.7 ^a	620.2 ^b	4.0	0.04
ADF	536.5	529.7	540.7	551.7	9.4	0.42

† Barley grain was substituted with SBP as 0.0%(SBP0), 33%(SBP33), 66%(SBP66) or 100%(SBP100) a, b, c Means in row with different superscript letter are different

Key Words: sugar beet pulp, nutrients digestibility, dteers

T317 Adjustment of physically effective fiber sources in diets for beef cattle. R. Goulart^{*}, J. Daniel, V. Santos, R. Amaral, G. Muraro, S. Toledo Filho, L. Nussio, and A. Pires, *University of Sao Paulo-ESALQ, Piracicaba, SP, Brazil.*

The physical effectiveness factor (fef) from forage and nonforage fiber sources was evaluated in a 6 × 6 Latin square trial using Nellore steers with six 19–d periods. After the 10–d adaptation period samples were collected from d 11 through 19. The six diets were composed of fiber sources: basal (low fiber content) with 10% NDF from corn silage (DM basis); high fiber (20% NDF from corn silage); and four diets containing 10% NDF from corn silage, and 10% NDF from each of the following sources: sugarcane, sugarcane bagasse, soybean hulls and high oil – cottonseed meal. All diets were formulated in order to provide a response function relating total chewing time (min/kg DMI) to fef value. This response was calculated assuming that corn silage NDF was completely effective (effectiveness factor = 1) and that the NDF from concentrate (corn and protein supplement) was completely ineffective (effectiveness factor = 0). Chewing activities were monitored and the feeding behavior from the steers was recorded every 5 min over one 24–h period during each sampling period. The fef values observed were: 1.19, 2.46, 0.41 and 0.00 for sugarcane, sugarcane bagasse, high oil – cottonseed meal and soybean hulls, respectively. Greater total chewing time (min/kg DMI) was observed for the diet which contained sugarcane bagasse (94.51 min/kg DMI) and the lowest mean for the diet which soybean hulls (51.64 min/kg DMI) (P < 0.05). The soybean hulls diet showed a fef value equals to zero, resulting in lower ruminal pH (6.00) when compared to the sugarcane bagasse diet (6.31) (P < 0.05). These results suggested that soybean hulls appeared to be poorer stimulator of chewing than the high oil cottonseed meal and therefore, not suitable to maintain adequate mean ruminal pH. Moreover, the sugarcane and sugarcane bagasse, showed higher fef than corn silage (p < 0.05).

Key Words: effectiveness factor, ruminal pH, Nellore steers

T318 Effect of infrequent roughage delivery on digestion and ruminal pH of beef steers fed concentrate diets. J. I. Arroquy^{*1,3}, J. Cervetto², M. Avila¹, and D. Daviu², ¹INTA Santiago del Estero, Santiago del Estero, Argentina, ²Univ. Nacional de Santiago del Estero-Fac. Agronomía y Agroindustrias, Santiago del Estero, Argentina, ³CONICET, Santiago del Estero, Argentina.

The objective of this experiment was to evaluate the effect of feeding a total mixed ration compared to feeding the roughage portion of the diet once every two days and separated of the daily delivered concentrate mix on digestibility and ruminal pH. Four ruminally fistulated beef steers (Braford; BW = 259 kg; SEM = 27 kg) were used in a factorial, four treatments by two periods (4 × 2) experiment. Treatment structure was 2 × 2 factorial, where first factor consisted of two diets: D1) 14% roughage: 86% concentrate; D2) 7% roughage: 93% concentrate. Roughage source of the diets was ground hay (*Setaria italica*); and concentrate portion had dry ground corn, cottonseed, and urea plus mineral-salt mix supplement. The second factor was roughage delivery in a total mixed ration (TMR) or the same proportion of ingredients but roughage offered once every 2-d and separated of the daily delivered concentrate portion of the diet (roughage every other day, REOD). Steers had continuous access to fresh water and were limit-fed daily at 2.9% BW (DM basis). There were no diet × roughage delivery system interaction for intake and digestion (e.g., OM, CP, NDF, and starch). Both diets were similar in intake and digestion. Roughage delivery system did not significantly affect intake and digestion of OM, CP, NDF, and starch. Intake means were 89.7 g/kg 0.75 BW (SEM = 11.1), 8.7 g/kg 0.75 BW (SEM = 0.6), 28.0 g/kg 0.75 BW (SEM = 4.2), and 38.2 g/kg 0.75 BW (SEM = 4.6) for OM, CP, NDF, and starch respectively. Average digestibility were 653 g/kg OM (SEM = 24), 576 g/kg CP (SEM = 56), 458 g/kg NDF (SEM = 80), and starch 877 g/kg starch (SEM = 28) for OM, CP, NDF, and starch respectively. Diet × roughage delivery system interaction tended to be significant for ruminal pH (P = 0.06). On average D2-REOD tended to have lower pH (P = 0.06) ruminal pH than the other treatments (e.g., D1-TMR, D2-TMR, and D1-REOD). In conclusion, under the conditions of this study, digestibility and ruminal pH was not affected in response to infrequent roughage delivery either in 7% or 14% roughage diet.

Key Words: roughage delivery, digestion, ruminal pH

T319 Ruminal pH profile of feedlot steers during a 3-week transition from a high-forage to high-concentrate diet. L. Holtshausen^{*}, K. A. Beauchemin, and K. S. Schwartzkopf-Genswein, *Agriculture and Agri-Food Canada, Lethbridge, AB, Canada.*

Ruminal pH profile, as an indicator of ruminal acidotic condition, of 16 cannulated crossbred beef steers (431 ± 25 kg BW) was measured during a diet transition period. Steers were transitioned from a 45 to 90% concentrate diet (DM basis) in 3 steps over 3 wk (+15% concentrate/wk). The diet consisted of barley grain, wheat distillers grain, corn silage and a mineral-vitamin supplement, with increasing amounts of corn silage replaced with barley grain. Ruminal pH was measured for 4 consecutive 24-h periods each week with indwelling ruminal pH electrodes. Minimum and mean ruminal pH were lower (P < 0.05) in wk 3 compared to the first 2 wk (minimum pH: 5.28, 5.20, 5.01; mean pH: 6.24, 6.10, 5.80 for wk 1, 2 and 3, respectively). Week × d interactions (P < 0.01) were observed. In wk 1, minimum and mean pH were higher on d 1 than on d 2, 3 and 4; in wk 2 and 3 it was similar or lower. The ruminal pH remained longer under 5.8 and 5.5 (P < 0.05) in wk 3 compared to the other wk (pH < 5.8: 5.4, 7.1, 12.6 h/d; pH < 5.5: 3.2, 4.7, 8.9 h/d for wk 1, 2 and 3, respectively), and there was a wk × d interaction (P < 0.01). In wk 1, duration under pH 5.8 and 5.5 were lower on d 1 than on

d 2, 3 and 4; in wk 2 and 3 it was similar or higher. Alternate transition diet protocols such as more diet steps with smaller grain increments or shorter initial and longer final steps may aid in reducing the incidence of sub-clinical and clinical acidosis.

Table 1. Ruminal pH profile for steers transitioning from 45 to 90% (+15% concentrate/wk) concentrate (DM basis)

pH	wk	Day				SE	P
		1	2	3	4		
Min	1	5.40 ^a	5.21 ^b	5.18 ^b	5.34 ^{ab}	0.084	0.15
	2	4.81 ^a	5.30 ^{bc}	5.50 ^b	5.21 ^c	0.092	<0.01
	3	4.85 ^a	4.94 ^a	5.12 ^b	5.11 ^b	0.051	<0.01
Mean	1	6.39 ^a	6.12 ^b	6.20 ^b	6.25 ^{ab}	0.074	<0.01
	2	5.90 ^a	6.09 ^b	6.24 ^b	6.16 ^b	0.079	0.01
	3	5.78 ^{ab}	5.72 ^a	5.81 ^{ab}	5.91 ^b	0.071	0.05
Duration (h) under							
5.8	1	3.4 ^a	6.8 ^b	5.5 ^{ab}	6.0 ^{ab}	1.09	0.01
	2	10.8 ^a	7.1 ^b	4.6 ^b	5.8 ^b	1.29	<0.01
	3	13.1 ^{ab}	14.1 ^a	12.0 ^{ab}	11.1 ^b	1.25	0.09
5.5	1	1.9 ^a	4.4 ^b	3.4 ^{ab}	3.2 ^{ab}	0.93	0.07
	2	8.2 ^a	4.4 ^b	2.9 ^{ab}	3.2 ^{ab}	1.09	<0.01
	3	10.4	9.9	8.0	7.3	1.35	0.29

Key Words: ruminal pH, transition, feedlot cattle

T320 Influence of processing method on comparative digestion of white corn vs. conventional steam-flaked yellow dent corn in finishing diets for feedlot cattle. A. Plascencia^{*1}, M. Cervantes¹, M. A. Lopez-Soto¹, D. May¹, and R. A. Zinn², ¹Universidad Autonoma de Baja California, Mexicali, Baja California, Mexico, ²University of California, Davis, El Centro.

Four Holstein steers (143 ± 3 kg) with cannulas in the rumen and proximal duodenum were used in a 4x4 Latin square design to evaluate the influence of processing method on comparative digestion of white corn. Treatments consisted of a basal finishing diet containing 80% corn grain (DM basis) as: 1) dry-rolled white corn (DRWC), 2) steam-flaked white corn, 0.36 kg/L flake density (SFWC-36) 3) steam-flaked white corn, 0.31 kg/L flake density (SFWC-31), and 4) steam-flaked yellow corn, 0.31 kg/L flake density (SFYC-31). Characteristics of ruminal, posruminal and total tract digestion of OM, starch, and N were similar (P > 0.20) for SFYC-31 and SFWC-31 treatments. Decreasing flake density (0.36 to 0.31 kg/L) of white corn did not affect (P = 0.23) ruminal OM digestion, but tended to increase (1.9%, P = 0.07) total tract OM digestion. Compared with dry rolling, steam flaking WC increased ruminal (9.4%, P = 0.05), posruminal (14.4%, P < 0.01) and total tract OM digestion (8.2%, P < 0.01) of OM, reflecting a corresponding increase in ruminal (13.3%, P < 0.01), posruminal (43%, P < 0.01) and total tract (12.3%, P < 0.01) starch digestion. Apparent total-tract N digestion also was greater (5.5%, P = 0.04) for SFWC than DRWC. There were no treatments effects on ruminal pH (P > 0.10). We conclude that compared with dry rolling, steam flaking markedly enhances the feeding value of white corn, optimal flake density being less than 0.36 kg/L. Although white corn has greater horny endosperm content, characteristics of site and extent of OM, starch and N digestion are similar to that of conventional yellow dent corn when processed to a similar flake density (0.31 kg/L).

Key Words: steer, white corn, digestion

T321 Use of whole oats in feedlot diets. D. J. Gibb*, Y. Wang, K. S. Schwartzkopf-Genswein, and T. A. McAllister, *Agriculture & Agri-Food Canada Research Centre, Lethbridge, Alberta, Canada.*

One hundred twenty steers (353 ± 3 kg) were utilized to assess the impact of including 15% whole oats (DM basis) in barley-based backgrounding and finishing diets, in place of 9% silage and 6% barley. Control and treatment diets included barley silage at 55 and 46%, respectively, in the backgrounding period, and at 9 and 0% during finishing. Supplement was included at 5% of DM and included monensin sodium at levels to provide 33 mg/kg in diet DM. One of the five pens per treatment was equipped with GrowSafe technology that monitored feeding behaviour of individual animals. Oat samples ($n = 12$) contained 35% NDF, which resulted in similar NDF levels between control and oat-based backgrounding (35%) and finishing diets (18%). Feeding whole oats during the backgrounding period increased average meal size (982.6 vs. 671.2 g; $P = 0.03$) and DMI (8.94 vs. 8.39 kg/d; $P = 0.0001$) but did not affect ADG (1.31 kg/d; $P = 0.48$), resulting in reduced gain/feed (0.147 vs. 0.160; $P = 0.008$). During the finishing period, feeding oats increased eating rate (156.7 vs. 142.2 g/min; $P = 0.04$) without affecting DMI (11.96 kg/d; $P = 0.27$) or meal size (1336 g; $P = 0.11$). However, both ADG (1.90 vs. 1.73; $P = 0.002$) and gain/feed (0.158 vs. 0.145; $P = 0.003$) were improved when oats were included in the finishing diet. Dressing percentage was reduced (58.1 vs. 58.7; $P = 0.03$) with the inclusion of oats, but carcass weight (377.6 kg; $P = 0.61$), back fat (11.8 mm; $P = 0.69$), ribeye area (92.4 cm²; $P = 0.27$) and quality grade (38.7% AAA; $P = 0.13$) were not affected by diet. Although similar rates of total (16.5%; $P = 0.50$) and severely abscessed livers (10.2%; $P = 0.95$) indicate similar digestive health between diets, the impact of more rapid eating of finishing diets on variables such as bloat is uncertain.

Key Words: oats, feedlot, eating behaviour

T322 Performance of steers fed a high energy oat as a replacement for barley or corn in growing and finishing diets. G. R. Zalinko*¹, B. G. Rossnagle², V. J. Racz¹, D. A. Christensen¹, and J. J. McKinnon¹, ¹*Department of Animal and Poultry Science, University of Saskatchewan, Saskatoon, SK, Canada,* ²*Department of Plant Sciences, University of Saskatchewan, Saskatoon, SK, Canada.*

Two trials were conducted to evaluate performance and carcass traits of steers fed a low lignin hull, high oil groat oat as a replacement for barley or corn in feedlot diets. In trial 1, 400 steers (275.4 ± 20.8 kg) were fed one of two diets (37.8% barley or oat grain, DM basis). DMI was lower ($P < 0.05$) (7.49 vs. 7.72 kg/d) and gain to feed improved ($P < 0.01$) (0.171 vs. 0.159 kg) for steers fed the oat-based diet. Calculated NE_m (1.80 and 1.71 Mcal/kg) and NE_g (1.17 and 1.09 Mcal/kg) values were higher for the oat-based diet. In trial 2, 240 steers (341.7 ± 18.1 kg) were fed one of three finishing diets with barley, corn or oat grain as the cereal grain. Target slaughter weight was 650 kg. Steers fed the oat diet had lower ($P < 0.01$) ADG than barley or corn-fed cattle (1.40, 1.69 and 1.84 kg/d, respectively) reflecting lower ($P < 0.01$) DMI (9.56, 10.84 and 11.56 kg/d, respectively). Calculated NE_m (1.93 ± 0.01) and NE_g (1.29 ± 0.01) values were similar between diets indicating that the poorer performance of the oat-fed cattle was due to reduced DMI. Carcass weight and dressing percentage was lower ($P < 0.01$) for steers fed the oat diet. Rib composition did not differ ($P > 0.05$) between treatments although the corn-fed cattle had higher ($P < 0.05$) extractable fat in the *l. dorsi*. Stearic acid (C18:0) content of the *l. dorsi* of oat-fed cattle was higher ($P < 0.01$) than that of the barley or corn-fed cattle. The ratio of polyunsaturated to saturated fatty acids in the muscle of oat and corn-fed cattle was higher ($P < 0.05$) than barley-fed cattle. Results indicate that the energy value of this oat

is equivalent or superior to that of barley for growing cattle, however further research is required to identify factors limiting feed intake of finishing cattle fed this new oat cultivar.

Key Words: low lignin hull, cattle performance, carcass traits

T323 Effects of replacing barley with corn grain in finishing diets on VFA concentration and ruminal ammonia nitrogen of Holstein male calves. F. Fatehi, M. Dehghan-Banadaky*, K. Reza-Yazdi, M. Moradi-Shahrbabak, and H. Bahrami, *The University of Tehran, Karaj, Tehran, Iran.*

Twenty five Holstein Male calves (body weight: 276 ± 79 kg) were used to determine the effects of five different ratios of barley to corn grain (100:0, 25:75, 50:50, 75:25, 0:100) in finishing diets on rumen parameters for 110 days. Calves were allotted by weight to 5 groups and used in a completely randomized design. rumen liquor were sampled every 30 days. There were no differences among concentration of Butyrate and Isovalerate among calves. When the proportion of barley in diets decreased, the ruminal total VFA, propionate and valerate concentration decreased ($P < 0.05$). inversely, acetate concentration and acetate to propionate ratio increased ($P < 0.05$). The postfeeding ruminal pH was more stable for animals fed the higher proportion of corn, then declined at a lower rate up to 3 h for this animal. It is notable that for all diets, ruminal pH was ≈ 5.7 , which Van Houtert (1993) suggested was required to maximize growth of ruminal bacteria. Diets with higher proportion of Barley had greater ($P < 0.05$) at 0 h and lower ($P < 0.05$) concentrations at 3 and 6 h than Diets with higher proportion of Barley. Finally Regardless to time, When the proportion of barley in diets decreased, the ruminal NH₃ N concentrations in rumen increased ($P < 0.05$).

Key Words: barley, corn, finishing diets

T324 The effect of dietary protein on immune response in receiving steers. E. P. Lane*, E. S. Vanzant, K. R. McLeod, and M. N. Steinman, *University of Kentucky, Lexington.*

Growing, crossbred steers ($n = 192$; initial BW = 259 ± 0.4 kg) from central Kentucky markets were used to study effects of protein level and source on growth and immune response of newly received steers in a 30-d receiving period. Steers were allotted by weight to 24 pens which were assigned randomly within weight blocks to receive one of four experimental diets ($n=6$): two metabolizable protein (MP) levels (80% or 100% of NRC MP requirements for 1.13 kg/d gain) and one of two protein sources, differing in ruminal protein degradability (SBM or SoyPlus, West Central, Ralston, IA), in a 2×2 factorial arrangement of treatments. Formulated degradable intake protein levels were: 62%, 57%, 68%, and 68% of CP for SoyPlus 80%, Soyplus 100%, SBM 80%, and SBM 100%, respectively. Steers were weighed on d 0 and 30. On day 0, steers were vaccinated (Vista Once-SQ, 20/20 Vision 7 with SPUR, Intervet, Madison, NJ; *Moraxella ovis*, Novartis, Greensboro, NC) and drenched with an oral anthelmintic (Safe-Guard, Intervet). Additionally, to assess humoral immune response to a novel antigen, steers were inoculated on d 0 and 30 with a Leptospirosis vaccine (L5-SQ, Intervet). Blood samples were collected on d 0, 30, and 58 for measurement of antibody titers to *Leptospira* serovar hardjo (LSH). On day 30, all steers were removed from treatments and placed on fescue pastures. Residual effects of treatments on immunological status were evaluated in 160 of the steers (evenly representing treatments and blocks) by measuring the antibody titer at d 58. Only DMI had a protein source

x level interaction ($P < 0.01$). Steers fed the 100% MP diet had higher ($P < 0.01$) ADG (1.22 vs 1.02 kg/d), gain:feed (0.19 vs 0.16) and 30-d LSH titers than steers fed the 80% MP diet. Treatments did not affect 56-d LSH titers ($P > 0.63$). Dry matter intake was lower ($P < 0.03$) with the SBM 100 treatment than with any of the other treatments. Gain:feed tended ($P = 0.10$) to be greater with SBM than with SoyPlus. Both gain and immunological status of the steers responded to increasing levels of MP showing that immunological function can be depressed when dietary protein is limited.

Key Words: protein, immunological, beef

T325 Feeding soybean meal, urea or slow release urea (Optigen®) to finishing Zebu cattle. R. Carareto*¹, F. A. P. Santos¹, G. B. Mourão¹, D. F. A. Costa², A. M. Pedrosa¹, J. A. D. Pacheco Junior¹, and J. C. Martinez³, ¹University of Sao Paulo, Piracicaba, São Paulo, Brazil, ²University of Queensland, St. Lucia, Brisbane, Australia, ³Faculdade de Ciências Agrárias e Veterinárias, Jaboticabal, São Paulo, Brazil.

The objective of this trial was to compare 3 supplemental N sources, conventional soybean meal (SBM), urea (U) or slow release urea (SRU) (Optigen®) in diets for finishing cattle. One hundred Nelore bulls with an average initial SBW of 389 kg were used in a 90-d feeding trial after a 21 days period for adaptation to high concentrate diets. Animals were blocked by SBW and randomly allotted to 20 pens. Experimental diets were isonitrogenous and contained (%DM) 8% hay, 59.5 to 63.5% dried citrus pulp, 10% ground sorghum, 12% corn co-product with 17% oil, 3% cane molasses, 1.6% mineral mix with monensin, and the respective supplemental N sources. Treatments were: 1) 5% SBM + 0.9% U; 2) 1.7% U; 3) 2.5% SBM + 0.5% SRU + 0.8% U; 4) 1% SRU + 0.8% U; 5) 1.5% SRU + 0.3% U. Data were analyzed based on a randomized complete experimental design, with pens as the experimental units, using the Proc. Mixed of SAS (1999) version 9.2 for Windows. Dry matter intake, ADG and feed efficiency (DMI/ADG) were not affected by treatments ($P > .05$) (Table 1). Finishing Nelore bulls performance was not improved by feeding SBM or SRU compared to conventional urea.

Table 1. Dry matter intake (DMI), average daily gain (ADG) and feed efficiency (DMI/ADG) of finishing Nelore bulls fed 3 different supplemental N sources.

Variables	T1	T2	T3	T4	T5	Standard Error	P _{r>} F
ADG (Kg /day)	1.48	1.50	1.49	1.48	1.50	0.064	0.953
DMI (kg DM/day)	10.35	10.64	10.76	10.47	10.62	0.132	0.227
DMI/ADG	7.20	7.55	7.44	7.31	7.14	0.378	0.936

Key Words: soybean, urea, finishing cattle

T326 The effects of crude protein concentration and urea source on nitrogen metabolism in Holstein steers. V. B. Holder*¹, S. Elkadi¹, J. M. Tricarico², E. Vanzant¹, K. M. McLeod¹, and D. L. Harmon¹, ¹Department of Animal and Food Sciences, University of Kentucky, Lexington, ²Alltech Biotechnology, Nicholasville, KY.

The objective of the study was to compare the effects of a slow release urea and regular feed grade urea on whole animal nitrogen metabolism when fed at two different concentrations of protein intake. The experiment was conducted utilizing 8 growing Holstein steers (BW = 265±18kg) in a replicated 4 × 4 Latin square experimental design with

a 2 × 2 factorial treatment structure. Treatment factors included dietary crude protein (CP) concentration (10.9 vs. 12.1%) and urea source (slow release vs. regular feed grade). The higher crude protein diets were formulated to provide sufficient metabolizable protein to allow 800g of daily live weight gain. The lower CP diets were formulated to supply 82% of the metabolizable protein requirement for 800g of daily live weight gain. All diets were formulated to contain equivalent concentrations of non protein nitrogen (NPN) as a percentage of CP (20.5%). Intake was adjusted at the beginning of each period to be 2.28% of body weight. Experimental animals were adapted to each diet for 14 days before being transferred to metabolism stalls for 7 days of total urine and fecal collection. Total nitrogen efficiency was calculated as the difference between intake and excretion expressed as a percentage of nitrogen intake, and urinary N excretion was expressed as a proportion of total N intake. There was no effect of CP concentration, urea source or their interaction on total nitrogen efficiency (30%). There was no significant CP concentration × urea source interaction or urea source effect on urinary nitrogen excretion; however, the proportion of urinary nitrogen excretion was greater for the 12.1% crude protein diets (37% vs. 31%, $P < 0.05$). Thus, the proportion of nitrogen excreted in urine can be reduced by reducing the total nitrogen content of the diet. However, no further benefits of changing urea source were detected.

Key Words: nitrogen balance, nutrient synchrony

T327 Feed intake by Nelore and Red Norte bulls finished in feedlot. O. R. Machado Neto¹, M. M. Ladeira*¹, T. M. Gonçalves¹, L. S. Lopes¹, R. L. Oliveira², M. S. Bassi¹, D. M. Oliveira¹, J. S. Ribeiro¹, and E. O. S. Saliba³, ¹Federal University of Lavras, Lavras, MG, Brazil, ²Federal University of Bahia, Salvador, BA, Brazil, ³Federal University of Minas Gerais, Belo Horizonte, MG, Brazil.

The objective of this work was to determinate the dry matter intake (DMI) in Nelore (NE; *Bos indicus*) and Red Norte (RN; *Bos taurus* *Stimes*; *Bos indicus*) bulls finished in feedlot, and the prediction of this traits by NRC (2000), CNCPS 5.0 and BR-CORTE systems. Forty one animals feedlot in collective pens were used, 19 NE and 22 RN with 361±31 and 367±30 kg of initial live weight, respectively. The animals had an adaptation period of 28 days. The experimental period lasted 56 days when individual intake was measured using the hidroxy phenil propan LIPE® (rich extracted lignin), chromic oxide and indigestible dry mater (iDM) markers. The diet chemical composition was 14.3% of CP, 30.1% of NDF and 70.3% of TDN. Predicted intakes by the systems NRC, CNCPS and BR-CORTE were compared with the actual, using the procedure PROC REG by software SAS (1999). There was no difference ($P > 0.05$) in DMI between the genetics groups when expressing in kg/day (10.66 versus 10.44). When expressed as percentage of live weight (%LW) it was observed higher DMI ($P < 0.05$) for the NE (2.55 versus 2.39%). It's possible to observe, because the slope and intercept of regression analysis, that all systems evaluated showed low accuracy in DMI (Table 1). In conclusion, Nelore bulls presented more intake than Red Norte, and the requirement systems haven't accuracy in intake prediction for Nelore, and Red Norte bulls.

Table 1. Regression analysis of the actual dry mater intake (DMI) values and predicted by systems NRC, CNCPS e BR-CORTE to Nellore and Red Norte

Nellore							
System	r ² _a	Slope			Intercept		
		Value	SEM	P	Value	SEM	P
NRC	-0.0301	-0.09011	0.130	<0.01	9.807	1.401	<0.01
CNCPS	-0.0390	-0.07674	0.134	<0.01	10.318	1.444	<0.01
BR-CORTE	-0.0513	-0.07212	0.206	<0.01	10.433	2.213	<0.01
Red Norte							
System	r ² _a	Slope			Intercept		
		Value	SEM	P	Value	SEM	P
NRC	0.0116	0.12409	0.111	<0.01	7.95	1.164	<0.01
CNCPS	0.0060	0.12703	0.119	<0.01	8.56	1.253	<0.01
BR-CORTE	-0.0443	0.05078	0.153	<0.01	9.010	1.607	<0.01

Key Words: *Bos indicus*, crossbreed, requirements systems

Ruminant Nutrition: Grass Cattle

T328 Nutrient balance and fermentive parameters of continuously cultured rumen fluid maintained with bermudagrass hay and supplied with additional soybean hulls and(or) corn. A. I. Orr* and B. J. Rude, *Mississippi State University, Mississippi State.*

Ruminal fluid was continuously cultured using the BioFlo® 110 fermentation system to evaluate the *in vitro* fermentive parameters of ground moderate-quality bermudagrass hay either alone (HAY; 20 g DM L⁻¹ d⁻¹) or supplemented (7 g DM L⁻¹ d⁻¹) with corn (CORN), soybean hulls (SBH), or both (25:75; MIX). Each of 4 vessels were maintained at 2L and 39°C while under constant agitation and N₂ sparging. Every 3h (between 0700 and 1900) fresh mineral-buffer was added. Culture pH did not to exceed 6.5 by automated addition of 2N H₂SO₄. Data was analyzed as a Randomized Complete Block, blocked by week (n=5). Each week, fresh ruminal cultures were grown for 9 d with sampling d 7, 8, and 9. Addition of hay DM was uniform ($P = 0.34$) among cultures (ranging from 39.07 to 39.14 g). Total DM added was slightly greater ($P < 0.0001$) for CORN (53.78 g) than SBH or MIX (53.61 and 53.58 g, respectively), and all 3 received more DM than HAY (39.07 g). Nutrient balance indicated DM disappearance was greatest ($P < 0.0001$) for MIX and least for HAY (0.0045 and -0.0058 g, respectively). No differences ($P = 0.10$) were observed for CP (-0.24 to -0.17 g), NDF (-0.04 to -0.01 g), or ADF (-0.001 to 0.02 g) disappearance. Culture pH was least ($P < 0.01$) for CORN from 2 to 6 h post-feeding (5.94 to 6.18). Ruminal ammonia-N was least ($P < 0.01$) for CORN 0 thru 12 h post-feeding (from 13.3 to 17.33 mg/dL) with MIX resulting in the next lowest ($P < 0.01$), 6 thru 12 h post-feeding (ranging from 16.59 to 18.55 mg/dL). Ammonia-N concentrations were evaluated as polynomial functions over time revealing a weak fit to the model for CORN (quartic; $P < 0.01$; Adj-R² = 0.1135), SBH (cubic; $P < 0.01$; Adj-R² = 0.1024), and MIX (quadratic; $P < 0.01$; Adj-R² = 0.0849). Data for HAY did not adequately fit any of the polynomial models. Analysis of VFA is forthcoming. Fermentive characteristics indicate a more complete and efficient utilization of nutrient DM and ammonia-N by cultures provided CORN and MIX. Additional evaluation is needed to assess nutrient disappearance under each ascribed diet.

Key Words: continuous culture, rumen, soybean

T329 Effects of dietary energy source in late gestation diets on pre- and post-partum beef cow performance. A. E. Radunz*, H. N. Zerby, F. L. Fluharty, and S. C. Loerch, *The Ohio State University, Wooster.*

Mature Angus-cross (n = 180) beef cows (initial body weight = 573 ± 5 kg) were used to determine the effects of late gestation dietary energy source on pre- and post-partum cow performance. Cows were blocked by location (n = 3) and stratified by body weight (BW), body condition score (BCS) and age (5 pens/treatment). Cows were adapted to diets starting at approximately 200 d of gestation and fed until 1 wk prior to expected calving date. Cows were fed 1 of 3 energy sources: hay (HAY); corn (LFC); and dried distiller grains (DDGS). Cows allotted to HAY were allowed ad libitum access to round-bale grass hay and averaged 12.2 kg DMI/d. Limit-fed corn and DDGS diets provided 4.8 kg whole corn or 4.0 kg DDGS, plus 2.2 kg hay, and 1.0 kg supplement to meet nutritional needs during late gestation. Following parturition, cows were fed a common diet and managed as one group per location. Milk production was measure by weigh-suckle-weigh at an average of 31, 100, and 164 d postpartum. At 2 locations, cows were synchronized for estrus and bred 81 ± 4 d postpartum. Cows fed DDGS gained more BW than either HAY or LFC (1.6, 1.1, and 1.1 ± 0.8 kg/d, respectively; $P < 0.01$) and had improved ($P = 0.02$) BCS as compared to HAY at the end of gestation. However, at the end of lactation (164 & polusmn; 7 d) BW ($P = 0.23$) and BCS ($P = 0.13$) were not different between treatments. Prepartum energy source did not affect first service conception rates ($P = 0.31$) or overall pregnancy rates ($P = 0.79$) postpartum. Milk production and composition were not different ($P > 0.2$) among treatments. Daily feed costs during late gestation were less for DDGS as compared to LFC and HAY. Limit-feeding DDGS as an alternative energy source in late gestation diets can improve cow BCS and BW gain and reduce daily feed costs; however these differences in weight gain and BCS at the end of gestation did not impact postpartum reproduction performance, milk production, or cow performance. Calf data are presented in a companion abstract.

Key Words: prepartum nutrition, beef cattle, energy source