

Ruminant Nutrition: Beef: Proteins and Carbohydrates

727 Evaluation of triticale dried distillers grain as a barley silage substitute in feedlot finishing diets. K. T. Wierenga^{*1}, T. A. McAllister², D. J. Gibb², A. V. Chaves², E. K. Okine¹, K. A. Beauchemin², and M. Oba¹, ¹University of Alberta, Edmonton, AB, Canada, ²Agriculture and Agri-Food Canada, Lethbridge, AB, Canada.

The objective of this study was to assess the value of triticale dried distillers grains with solubles (DDGS) as a substitute for barley silage in a dry-rolled barley (DRB) grain-based feedlot finishing diet. The trial used 144 intact (478 ± 84 kg) and 16 rumen cannulated (494 ± 50 kg) crossbred yearling steers arranged in a complete randomized design and a replicated 4 × 4 Latin square design, respectively. Steers were housed in 16 pens; 8 pens with 10 intact steers / pen, and 8 pens equipped with the GrowSafe system housing 8 intact and 2 rumen cannulated steers / pen. Steers were fed one of 4 diets (DM basis): 1) 85% DRB and 10% barley silage (CON); 2) 65% DRB, 20% triticale DDGS, and 10% barley silage (D-10S), 3) 65% DRB, 25% triticale DDGS, and 5% barley silage (D-5S), and 4) 65% DRB, 30% triticale DDGS (D-0S). Ruminant pH was measured with indwelling electrodes over 4 7-d periods. Steers fed D-10S had less variation in mean ruminal pH ($P = 0.008$) and DMI ($P = 0.009$), and tended to have higher DMI ($P = 0.08$), but similar ADG and gain:feed ratio (G:F) as compared with those fed CON. In addition, steers fed D-10S tended to have increased back fat ($P = 0.10$), and lower dressing percentage ($P = 0.06$), rib eye area ($P = 0.10$) and meat yield ($P = 0.06$) compared with those fed CON. Severity and number of abscessed livers was higher ($P = 0.006$) in steers fed D-10S as compared with CON. Replacing barley silage with triticale DDGS linearly decreased mean ruminal pH ($P = 0.006$), while duration ($P = 0.006$ and $P = 0.01$) and area ($P = 0.02$ and $P = 0.05$) below pH 5.5 and 5.2 linearly increased, and tended to linearly decrease DMI ($P = 0.10$) and increase ($P = 0.06$) G:F. Although mean ruminal pH decreased as triticale DDGS replaced barley silage, the trend for improved growth performance suggests that lower ruminal pH did not affect animal performance; however a dietary additive for liver abscess control is advised.

Key Words: triticale DDGS, finishing diet, cattle

728 Examination of rumen bacterial community changes in feedlot cattle. R. M. Beliveau^{*1,2}, W. Z. Yang², R. J. Forster², J. J. McKinnon¹, and T. A. McAllister², ¹Department of Animal and Poultry Science, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, ²Agriculture and Agri-Food Canada Research Center, Lethbridge, Alberta, Canada.

A feeding trial was conducted to determine the effects of 2 finishing rations on rumen fermentation conditions and the diversity of rumen bacterial populations. Eight animals used in a concurrent replicated 4 × 4 Latin square feeding trial were sub-sampled over 4–21 d periods. The 2 diets representing extremes in forage to concentrate ratio were a typical finishing ration (85% barley, 10% silage, 0% DDGS) and an atypical ration containing no forage (60% barley, 0% silage, 35% DDGS). Rumen digesta was collected one hour before- and 3 h post-feeding on d 14 of each period. Samples were divided into liquid and solid fractions and bacterial DNA was extracted. Continuous in-dwelling pH measurements were averaged over 5 d (d11 – d16). PCR-DGGE profiles were created using universal bacterial 16S rDNA primers and analyzed using Dice coefficients to obtain percent similarity between branch clusters using UPGMA in BioNumerics software. Cluster analysis showed high levels of similarity (90.6%) between pre and post-feeding samples, however there was low similarity (≤40%) in banding profiles within each of the

dietary treatments. Dendrogram representation of the cluster analysis showed no divergence between the 2 treatments based on the banding patterns of each sample. Diversity profiles of the liquid and solid fractions of digesta also showed a low level of similarity (37.0%), however clustering within liquid and within solid samples was visible. Daily range in ruminal pH, pH at time of sampling or nadir did not appear to alter bacterial diversity as determined by cluster analysis. These results indicate that the detectable bacterial community structure in the rumen is highly diverse and influenced by a variety of environmental and host factors. Animals fed high concentrate feedlot rations maintain similar bacterial profiles despite a wide divergence in forage to concentrate ratio.

Key Words: DGGE, rumen microbial diversity, pH

729 Longitudinal gene network and pathway analysis in skeletal muscle from early-weaned Angus steers fed high-starch or low-starch diets during the growing phase. S. J. Moisa^{*}, D. E. Graunard, L. L. Berger, D. B. Faulkner, S. L. Rodriguez-Zas, R. E. Everts, H. A. Lewin, and J. J. Loor, Department of Animal Sciences, University of Illinois, Urbana.

Metabolic regulation in complex organisms relies partly on transcriptional control of gene networks as a long-term mechanism affecting the level of expression of several key enzymes. Objectives were to evaluate temporal gene expression profiles in longissimus lumborum (LL) of early-weaned (155 ± 10 d age at weaning) Angus steers (n = 7/diet) fed a high-starch (HiS, NE_G = 5.98 MJ/kg diet dry matter) or low-starch (LoS, NE_G = 4.97 MJ/kg) diet for 120 d, at which point all steers were switched to a common feedlot diet until slaughter. LL biopsies for transcript profiling and blood for metabolite analyses were collected at 0, 56, 112, and 224 d of feeding. A 13,257 bovine oligonucleotide (70-mers) array was used for transcript profiling. Functional analysis was performed by means of Ingenuity Pathways Analysis and DAVID. Analysis of variance using a false discovery rate <0.01 revealed ca. 5,000 differentially expressed genes (DEG) due to time alone. During the growing phase, the most striking differences occurred at 60 vs. 0 d when a total of 1,471 DEG were observed. The number of DEG due to time, however, was 3,702 at 224 vs. 0 d. Within the 1,471 DEG, the functional analysis revealed >45 enriched canonical pathways (e.g., acute phase response signaling, fatty acid metabolism, ERK/MAPK signaling). However, initial analysis based on expression pattern (i.e., up- or downregulation) of the genes within pathways indicated that the putative function of most of those was inhibited. Fewer canonical pathways were enriched within DEG at 224 vs. 0 d. These included oxidative phosphorylation, mitochondrial dysfunction, and LPS/IL-1 Mediated Inhibition of RXR Function. Expression patterns of genes within these pathways revealed an overall activation. Results revealed marked adaptations in networks and pathways during rapid growth of skeletal muscle.

Key Words: systems biology, transcriptomics, energy

730 Carbohydrate-responsive element binding protein (MLXIPL) and PPAR γ gene network expression in longissimus lumborum of early-weaned and normal-weaned Angus steers fed a high-starch diet during the growing phase. S. J. Moisa^{*}, D. W. Shike, D. B. Faulkner, and J. J. Loor, University of Illinois, Urbana.

Our previous work indicated precocious upregulation of adipogenic gene networks in longissimus lumborum (LL) of early-weaned Angus steers

fed a high- vs. low-starch diet during the growing phase (Graugnard et al., 2009; Br. J. Nutr. Dec. 21 [E-pub ahead of print]). Further, data provided evidence of metabolic imprinting effects of high-starch on the transcription factors sterol regulatory element-binding transcription factor 1 (SREBF1) and carbohydrate responsive element binding protein (MLX interacting protein-like, MLXIPL), both of which had greater expression in the early-weaned/high-starch-fed group after 120 d of feeding a common finishing diet. To examine the effect of weaning age on transcriptional networks associated with adipogenesis due to high-starch, 7 early-weaned (EW, 163 ± 17 d old) and 7 normal-weaned (NW, 213 ± 17 d old) calves were used and managed to receive a corn-based creep supplement (NW) or a high-starch diet (EW). For the ~100 d treatment period, EW calves remained in the feedlot and NW calves nursed their dams while on pasture. NW calves were weaned ca. 230 d postpartum and joined the early-weaned calves at the feedlot at which point both groups were fed a common finishing diet until slaughter. LL biopsies were collected at 0 (early weaning), 25, 50, 100 (normal weaning), mid-way through finishing, and 1 wk before slaughter for transcript profiling using quantitative PCR. Preliminary results from the treatment period showed that expression of both PPARG and MLXIPL was greater (ca. 2.5- and 3-fold, $P < 0.05$) in NW vs. EW steers at the start of the study. However, EW steers had gradual increases (diet × time $P < 0.05$) in both PPARG and MLXIPL such that at the end of the treatment period their expression averaged 3.4- and 5-fold relative to start of treatments. During that time-frame, expression of both genes averaged 1.3-fold of the expression at the start of treatments in NW steers. Results indicated a marked pro-adipogenic response of high-starch feeding at an early age.

Key Words: adipogenesis, nutrition, transcriptomics

731 Effects of fructose-based block supplement on ruminal concentration of lactate and growth of lactate-utilizing bacteria in forage-fed cattle. K. A. Miller*, G. L. Parsons, M. J. Quinn, and J. S. Drouillard, *Kansas State University, Manhattan.*

Acidosis is common among cattle as they are transitioned from forages to concentrates due to accumulation of lactate and other organic acids. This study was conducted to determine if supplementation with a fructose-based supplement could stimulate ruminal production of lactic acid and subsequent growth of lactate-utilizing bacteria in forage-fed cattle. A mixture of fructose corn syrup and vegetable oil (4%, DM basis) was dehydrated in a steam-jacketed kettle (121°C), subjected to a vacuum, discharged into containers, and cooled to form a hardened, amorphous mass. Ruminally fistulated heifers ($n = 12$) were blocked by BW (535 ± 54 kg), placed into individual pens, and randomized to CONTROL (no block) or BLOCK (fructose block fed at 0.9 kg/d) treatments. Heifers had ad libitum access to prairie hay and salt for 10 d, after which supplement was offered to cattle in the BLOCK treatment for 3 d by dosing directly into the rumen via the fistula at 0700 h. Ruminal digesta was sampled after 1 and 3 d of supplementation every 30 min for 8 h post-feeding to determine effects on ruminal pH, lactate, and VFA. Anaerobic cultures containing lactic acid as substrate were inoculated with strained ruminal fluid, and turbidity changes were monitored for 24 h as an indicator of capacity for lactate utilization. Ruminal pH was lower ($P < 0.01$) for the first 3 h after administration of the block. Ruminal concentrations of lactate (3.38 mM versus 0.66 mM) and butyrate (6.6 versus 4.0 mM) were greater for BLOCK heifers compared with CONTROLS ($P < 0.01$). Incubation of ruminal contents in lactate media revealed greater ($P < 0.05$) capacity for lactate utilization in BLOCK heifers. Feeding fructose-based blocks increased ruminal lactate production and subsequent growth of lactate-utilizing bacteria.

These data provide a foundation for further investigations into possible application of fructose-based supplements to prevent acidosis when cattle are transitioned from forages to concentrate-based diets.

Key Words: fructose, lactic acid, acidosis

732 Effects of corn steep liquor in low-moisture blocks processed under vacuum or at atmospheric pressure on performance of growing heifers fed forage-based diets. K. A. Miller*, G. L. Parsons, L. K. Thompson, and J. S. Drouillard, *Kansas State University, Manhattan.*

A study was conducted to evaluate a novel process for manufacturing low moisture supplement blocks containing corn steep liquor (CSL) and effects on growing heifer performance. Crossbred heifers ($n = 359$; BW 236 ± 8.9 kg) were utilized in a randomized complete block design. Heifers were fed a basal diet containing (DM basis) 44% corn silage, 29% corn stalks, and 27% alfalfa hay, along with no supplement (CON), blocks containing 15% CSL processed at atmospheric pressure and high temperatures (HT-15), blocks processed under vacuum at low temperatures (LT-15), or blocks containing 40% CSL and processed under vacuum at low temperatures (LT-40). Heifers were fed their respective treatments 84 d, then fed a common diet 14 d to minimize differences in gut fill. Supplementing LT-15 or LT-40 blocks increased ADG over non-supplemented CON and HT-15 supplemented heifers ($P < 0.05$), but ADG were similar between the CON and HT-15 groups ($P > 0.8$), as well as for LT-15 and LT-40 treatments ($P > 0.6$). Forage DMI was similar among treatments ($P > 0.1$). Daily consumption of block supplements was greater for heifers fed LT-15 and LT-40 compared with those fed HT-15 ($P < 0.01$), but daily intakes of LT-15 and LT-40 blocks were not different ($P > 0.2$). Total intake (block intake + forage intake) was greater for heifers fed LT-15 and LT-40 blocks than non-supplemented heifers ($P < 0.05$). Total intakes of heifers fed HT-15 were intermediate and not different from CON or other block treatments ($P > 0.2$). Feed efficiency was not different among treatments ($P > 0.2$). Supplementing blocks containing CSL processed at low temperatures improves performance over non-supplemented heifers. However, when processed at high temperatures and at atmospheric pressure, adding CSL to low-moisture blocks yields no discernable benefit to cattle fed forage-based diets. This study reveals limitations in using heat sensitive ingredients in block supplements.

Key Words: low-moisture blocks, vacuum processing, condensed corn fermented extractives

733 Relationship between eating pattern and performance of Holstein bulls and steers fed high-concentrate rations using a computerized concentrate feeder. M. Devant*¹, S. Marti¹, and A. Bach^{2,1}, ¹*Department of Ruminant Production, IRTA, Barcelona, Spain*, ²*ICREA, Barcelona, Spain.*

A total of 132 animals (initial BW = 220 ± ± 22 kg and age = 172 ± 0.4 d) were used to study the relationship between feeding pattern and performance. Animals were randomly allocated in 6 pens with 2 pens for each treatment: 44 intact bulls, 44 steers castrated at 3 mo of age (CAS3), and 44 bulls castrated at 8 mo of age during the study (CAS8). The study finished at 285 d of life. Each pen had one computerized concentrate feeder (GEA WestfaliaSurge, Germany), one straw feeder, and one drinker. Concentrate and straw were offered ad libitum. Animals were weighed every 14 d and concentrate eating pattern (daily mean, CV, minimum and maximum) was averaged for each 14-d period. The relationships between each eating pattern parameter and ADG or concentrate efficiency were evaluated by regression analyses using a fit model procedure of JMP with animal as random effect. Overall, average

BW was 305 ± 58.3 kg, ADG 1.4 ± 0.53 g/d, feed efficiency $22 \pm 9.1\%$, daily intake 6.3 ± 1.01 kg/d ($21 \pm 0.5\%$ CV), daily feeder visits 6.3 ± 1.29 /d ($28 \pm 1.0\%$ CV), meal size 1.1 ± 0.25 kg ($63 \pm 1.3\%$ CV), meal duration 10.2 ± 2.20 min ($59 \pm 1.2\%$ CV), inter-meal time 244.8 ± 55.38 min ($59 \pm 0.7\%$ CV), and eating rate 112 ± 16.9 g/min ($32 \pm 2.1\%$ CV). In bulls, as CV of daily intake increased ($P < 0.001$, $r = -0.40$) ADG decreased. In addition, in bulls as maximum daily intake increased ($P < 0.001$, $r = -0.34$) efficiency decreased. In steers CAS8 as CV of daily intake increased ($P < 0.001$, $r = -0.36$) ADG decreased. In steers CAS3 as mean daily intake and maximum daily intake increased ($P < 0.001$, -0.53 and -0.55 , respectively) efficiency decreased. In addition, in CAS3 steers as mean and minimum eating rate increased ($P < 0.001$; $r = -0.47$ and $r = -0.37$, respectively) concentrate efficiency decreased. Also in steers CAS3 as mean and maximum meal size increased ($P < 0.001$; $r = -0.33$ and -0.33 , respectively) efficiency decreased. Bulls and steers have different relationships between feeding pattern parameters and performance.

Key Words: beef, monitoring, eating pattern

734 Effect of supplemental protein source during the winter on pre- and postpartum glucose metabolism. F. W. Harrelson^{*1}, S. L. Ivey¹, S. H. Cox¹, R. L. Dunlap II¹, J. T. Mulliniks¹, B. H. Carter¹, C. A. Löst¹, and M. K. Petersen², ¹New Mexico State University, Las Cruces, ²USDA-ARS Fort Keogh Livestock and Range Research Laboratory, Miles City, MT.

Circulating serum glucose concentrations as well as glucose utilization have been shown to be affected by forage quality. Supplemental protein provided to grazing range cows while consuming low quality forage may improve glucose metabolism. The objective of our study was to determine the effects of winter protein supplement strategy on serum glucose half-life, insulin response, as well as identify the effects of previous gestational protein supplementation on mid lactation milk yield. The study was conducted 2 consecutive calving seasons utilizing 5-yr old Angus and Angus crossbred cows ($n = 8/\text{trt}$ each yr, 530 kg average BW). Cows were supplemented until calving with 1) a control 36% CP (35% UIP of CP) cottonseed meal based cube (CON), hand-fed at 454 g/d delivered 3d/wk (\$16/45.4 kg), or 2) a self-fed 50:50 loose mineral and fishmeal 33% CP (60% UIP of CP) small supplement (SSP), formulated for a targeted consumption of 113g/d (\$52/45.4 kg). After calving, cows were supplemented similarly (CON at 908 g/d offered 3 d/wk). Supplemental protein source affected ($P = 0.03$) glucose half-life, whereby the SSP cows had a lower half-life compared with CON (62 and 85 min respectively). Supplement also influenced insulin area under the curve (AUC; $P < 0.01$) with CON having a larger area compared with the SSP treatment (95.18 ± 4.9 and 75.02 ± 4.8 respectively). Prepartum glucose AUC ($P = 0.10$) and insulin half-life ($P = 0.75$) were unaffected by supplement treatment. Milk yield or components was not affected ($P > 0.05$) by supplement; however year showed a significant ($P < 0.05$) effect on these parameters. Milk yield was decreased from $7531 \text{ g} \pm 299$ in yr 1 to $4328 \text{ g} \pm 293$ in yr 2, possibly due to lower forage quality (~3% CP vs. ~8% CP in yr 1). These results suggest that supplemental undegradable intake protein, during times of low quality forage, may improve glucose clearance.

Key Words: beef cattle, glucose, supplementation

735 Ruminant and rectal temperatures during acidosis challenge in beef cattle. J. L. Wahrmond^{*}, J. R. Ronchesel, C. R. Krehbiel, and C. J. Richards, Oklahoma State University, Department of Animal Science, Stillwater.

An experiment was conducted to determine the effects of ruminal acidosis challenge on ruminal temperature of beef steers. Twelve ruminally cannulated steers with ruminal temperature monitoring devices which recorded current temperature every 2 min were fed a 63% concentrate diet at 1.6% BW and randomly assigned to one of 3 challenge treatments: no dietary change (CON), half of diet replaced with cracked corn (HALF), or all of diet replaced with cracked corn (CORN). Acidosis challenge was initiated by ruminally dosing steers with their daily allotment of challenge treatment diets. Ruminal pH and rectal temperatures were recorded every 3 h for 72 h. All steers were offered CON diets at 24 and 48 h after challenge. Effects of treatment, day, hours since challenge/feeding, and all interactions were determined using the MIXED procedure of SAS. Relationships between ruminal and rectal temperatures and pH were measured using the CORR procedure of SAS. Ruminal pH showed a treatment \times d effect, as pH of CORN steers was lower ($P < 0.05$) than CON and HALF steers by 0.44 units on d 1, 0.67 units on d 2, and 0.34 units on d 3. Treatment did not affect ($P > 0.05$) rectal temperatures. There was a treatment \times hours since feeding effect for temperature change since initial ruminal temperature ($P < 0.05$). At time of feeding 24 and 48 h post-challenge, ruminal temperatures of CON and CORN steers were 0.04°C less than initial temperature, while those of HALF steers were 0.21°C greater ($P < 0.05$) than initial temperature. CORN and HALF steers exhibited a 0.21°C greater ($P < 0.05$) increase in ruminal temperature than CON steers 9 h after feeding. Rectal temperatures were correlated ($P < 0.05$) with ruminal temperatures for all treatments. Ruminal and rectal temperatures were negatively correlated ($P < 0.05$) with pH in HALF and CORN steers, but not in CON steers ($P > 0.05$). A 1.44 unit decrease since initial pH in CORN steers was correlated ($P < 0.05$) with a 0.14°C increase since initial ruminal temperature, but changes in these measurements were not correlated ($P > 0.05$) in HALF or CON steers. Decreasing pH associated with acidosis results in a rise in ruminal temperature.

Key Words: beef cattle, acidosis, body temperature

736 The influence of dietary protein regimens on crude protein and dry matter apparent digestibility in steers fed a steam-flaked corn based diet. E. C. Westover^{*1}, J. J. Wagner¹, T. E. Engle¹, T. C. Bryant², S. L. Archibeque¹, and J. Ham¹, ¹Colorado State University, Fort Collins, ²JBS Five Rivers Cattle Feeding, Greeley, CO.

Four hundred crossbred steers ($330 \text{ kg} \pm 0.8$ initial BW) were used to investigate the effects of dietary protein regimens on dry matter (DM) and crude protein (CP) digestibility, using acid insoluble ash (AIA) as an indigestible indicator substance. Cattle were randomly assigned to the following treatments that were applied to a 91% concentrate (steam-flaked corn based) diet: 1) High CP (HCP; 13.5% CP), 2) Oscillating CP (OCP; 11.62% CP diet fed Wednesday, Thursday, and Sunday and the HCP diet fed Monday, Tuesday, Friday, and Saturday), 3) Intermediate CP (ICP; 12.56% CP), and 4) Low CP (LCP; 11.62% CP). Urea was used to modify dietary CP concentrations. At the initiation of the experiment, steers were implanted with controlled release implant containing 200 mg trenbolone acetate and 40 mg estradiol. Steers were weighed every 28 d throughout the experiment and fecal grab samples were obtained over 2 d (d73 or d74; from 12 of pens per treatment) and frozen immediately. Weekly feed samples were collected, frozen, and then composited monthly. Feed and fecal samples were analyzed for DM, N (conversion factor = 6.25), and acid insoluble ash. Treatment tended ($P < 0.06$) to be a significant source of variation for CP digestibility. Steers receiving HCP diet had similar CP digestibility relative to steers receiving OCP and ICP diets. However, steers receiving the LCP diet had higher ($P < 0.04$) CP digestibility when compared with steers fed

HCP. Treatment was a significant ($P < 0.001$) source of variation for DM digestibility. Dry matter digestibility tended ($P < 0.06$) to be higher in OCP fed steers and was higher ($P < 0.001$) in LCP steers compared with HCP fed steers. Acid insoluble ash has been documented to be an accurate prediction of digestibility of DM and CP; however digestibility can be overestimated due to low AIA content in feed and feces samples. These data indicated that DM and CP digestibility can be influenced by dietary CP concentration.

Key Words: protein, digestibility, acid insoluble ash

737 Effects of rumen-protected methionine on performance and health of growing feedlot heifers. M. R. McDaniel*, D. A. Walker, K. M. Taylor, and C. A. Loest, *New Mexico State University, Las Cruces.*

Methionine is a limiting AA in growing cattle fed diets low in rumen undegradable protein. An experiment at the Clayton Livestock Research Center (Clayton, NM) evaluated the effects of supplementing rumen-protected Met (RPMET; METHIOPLUS, Kemin AgriFoods, Des Moines, IA) on performance and health of 718 Angus-cross heifers (average BW = 265 ± 27.8 kg). Heifers were randomly assigned to 4 treatments in 36 pens (9 pens/treatment), and were fed once daily diets that consisted of 77% Sweet Bran (Cargill Inc., Minneapolis, MN), 19.8% wheat silage, 0.24% urea, 2.95% supplement, and treatments (DM basis). Treatments were daily supplementation with 0, 7.5, 15.0, and 22.5 g of RPMET per head (estimated to supply 0, 4, 8, and 12 g/d of metabolizable DL-Met, respectively) that was mixed with the diet for a treatment group of cattle before feeding. Feed bunks were managed to maintain ad libitum intake. Performance and health were monitored for 56 d. Increasing RPMET from 0 to 12 g/d in the diets of heifers increased DMI (quadratic; $P = 0.02$), ADG (linear; $P = 0.02$), and G:F (linear; $P = 0.04$; Table 1). Supplying RPMET did not affect mortality ($P = 0.38$) and morbidity ($P = 0.19$). Supplementing a wet corn-gluten feed-based diet with RPMET improves performance of heifers during the growing phase.

We acknowledge R. Musser of Kemin AgriFoods for supplying METHIOPLUS and Cargill for supplying Sweet Bran.

Table 1. Effects of METHIOPLUS supplementation for 56 days on performance of growing feedlot heifers

Item	METHIOPLUS, g/d					P-value		
	0	7.5	15.0	22.5	SEM	Linear	Quadratic	0 vs suppl
DMI, kg/d	7.7	7.8	7.9	7.7	0.11	0.59	0.02	0.09
ADG, kg/d	1.48	1.55	1.57	1.55	0.045	0.02	0.06	<0.01
G:F	0.192	0.198	0.199	0.200	0.0027	0.04	0.47	0.04

Key Words: methionine, supplement, cattle

738 Influence of feeding increasing levels of dry or modified wet corn distillers grains plus solubles in whole corn grain-based finishing diets on pancreatic mass, and α -amylase and trypsin activity in feedlot cattle. H. Salim*¹, K. M. Wood¹, P. L. McEwen², I. B. Mandell¹, S. P. Miller¹, and K. C. Swanson¹, ¹*University of Guelph, Guelph, Ontario, Canada*, ²*Ridgetown Campus, Guelph, Ontario, Canada*.

One hundred and fourteen cross-bred steer calves and 17 heifers (BW = 357.2 ± 5.8 kg) were used in a completely randomized block design (2×3 factorial arrangement of treatments plus a control) to determine the effect of inclusion level and form of distillers grains plus solubles (DGS) on pancreatic mass, and α -amylase and trypsin activity using whole corn grain-based finishing diets. The DGS were fed at 0 (control), 16.7, 33.3, and 50% of ration DM using dry (DDGS) or modified wet (50% DM; MWDGS) product. Data were analyzed using GLM of SAS; treatment means were compared using contrast statements (control vs. other treatments, DDGS vs. MWDGS, inclusion levels of DGS (linear, quadratic), and interactions between form and linear and quadratic inclusion levels). There were no effects ($P > 0.10$) of dietary treatment on pancreatic weight (g and g/kg BW), however pancreatic protein concentration (mg/g) was greater ($P = 0.10$) in cattle receiving DGS vs. control. Pancreatic concentration of α -amylase activity (U/g) increased ($P = 0.09$) in cattle receiving DGS vs. control. Pancreatic concentration of trypsin activity (U/g) increased linearly ($P = 0.02$) with increasing inclusion of DGS. A form by quadratic effect of inclusion level interaction ($P = 0.02$) was observed for pancreatic trypsin activity (U/g) because pancreatic trypsin activity (U/g) decreased as DDGS increased from 16.7 to 33.3% of diet DM and then increased as DDGS increased from 33.3 to 50%, while pancreatic trypsin activity (U/g) increased linearly with increasing inclusion of MWDGS. These data indicate that pancreatic concentration of α -amylase and trypsin activity may be influenced by the form and inclusion level of DGS in whole corn grain-based finishing diets.

Key Words: beef cattle, pancreas, distillers grains