32 Comparison of NRC and industry dietary trace mineral standards for yearling feedlot steers. C. J. Berrett*, J.J. Wagner, K. L. Neuhold, E. Caldera, and T. E. Engle, *Colorado State University, Fort Collins.*

Effect of trace mineral (TM) concentration and source on yearling feedlot steer performance, carcass characteristics, and liver TM status, were determined utilizing 360 crossbred steers (initial BW = 350 ± 4.0 kg). Steers were blocked by initial BW and randomly assigned to one of 4 treatments (10pens/treatment; 9 hd/pen). Treatments consisted of (1) negative control (NC), no supplemental TM (basal diet contained 7.65 mg Cu/kg DM, 50.5 mg Zn/kg DM, 27.7 mg Mn/kg DM, and 0.12 mg Co/kg DM); (2) basal diet supplemented with 10 mg Cu/kg DM from $CuSO_4$, 30 mg Zn/kg DM from $ZnSO_4$, 20 mg Mn/kg DM from $MnSO_4$, 0.50 mg I/kg DM from EDDI, 0.10 mg Se/kg DM from Na_2O_3Se, and 0.10 mg Co/kg DM from $CoCO_3$ (NRC); (3) basal diet supplemented with inorganic forms of Cu, Zn, Mn, EDDI, Se and Co at consulting nutritionist recommendations (CNI, 20, 100, 50, 0.50, 0.20, and 0.20 mg of mineral/kg DM, respectively); and (4) basal diet supplemented with 66.6% inorganic and 33.4% organic Cu, Zn, Mn and Co, and inorganic forms of I and Se at iso-concentration to consulting nutritionist recommendations of treatment 3 (CNO). All steers were fed a high concentrate steam-flaked corn-based diet for 154 d. Steers were individually weighed on d −1, 0, 35, 121, 153, and 154. Continuous data were analyzed on a pen mean basis using a mixed model appropriate for a randomized block design (fixed effects = treatment and time; random effect = replicate). Categorical data were analyzed utilizing GLIMMIX (fixed effect = treatment; random effect = replicate). Initial and final BW, ADG, DMI, F:G and G:F ratios and calculated net energy recoveries were similar ($P > 0.23$) across treatments. Subcutaneous adipose tissue depth, HCW, KPH, yield grade, marbling score, and quality grade were similar across treatments ($P > 0.17$). Final liver Zn, Mn, Se, and Co concentrations were similar across treatments ($P > 0.37$). Under the conditions of this experiment, it appears that basal dietary concentrations of Cu, Zn, Mn, and Co were adequate for growth and performance of finishing yearling feedlot steers.

Key Words: beef cattle, feedlot, trace mineral

33 Effects of BovaZyme WP enzyme supplementation on frothy bloat and performance in stocker cattle grazing winter wheat. W. E. Pinchak*[1], D. W. Pitta[1,2], J. Miller[1], G. M. Shipp[3], and J. D. Fulford[1], *[1]Texas A&M AgriLife Research, Vernon, [2]School of Veterinary Medicine University of Pennsylvania, Kennett Square, [3]Texas A&M AgriLife Research, Amarillo.*

Frothy bloat is the major non-pathogenic cause of mortality and depressed performance in cattle grazing hard red winter wheat in the southern Great Plains. Value-added bloat intervention strategies mitigate direct bloat effects, while enhancing performance in non-bloated animals as well. Frothy bloat occurs when rumen bacteria produce extra-cellular, low gas permeable, polysaccharide biofilms. These biofilms interconnect with fluid and particle phase rumen contents to entrap fermentative gases and disrupt eructation. Supplementation with exogenous enzymes could decrease the rate and extent of polysaccharide formation, thereby decreasing bloat severity and duration. An in vitro experiment utilizing rumen fluid from bloated and non-bloated rumen cannulated steers and 4 levels of BovaZyme WP (York Ag Products Inc., York, PA) was conducted. BovaZyme supplementation to rumen fluid reduced ($P < 0.001$) foam strength, time of foam collapse, biofilm and viscosity. Subsequently, a grazing experiment was conducted utilizing 65 cross-bred heifers (avg. initial wt. = 191 kg) with 3 replicate groups of mineral Control and mineral + BovaZyme supplemented herds (10 to 12 hd) stocked at 1 ha/hd. During the study period, 58 of 65 head (89%) experienced at least one bloat event. The number of head that experienced bloat more than 4 d was greater ($P < 0.10$) in Control than in BovaZyme herds (7.0 d and 4.7 d respectively). Conversely, the percentage of head observed with bloat score 1 (minor bloat) was greater ($P < 0.10$) in BovaZyme than in Control herds (34.7% and 19.3% respectively). Collectively, BovaZyme supplementation decreased the severity and duration of bloat under the conditions of this experiment. Total gain and ADG for the grazing period was greater ($P = 0.1003$) for the BovaZyme supplemented mineral group than for the mineral only Control group at 6.71kg and 0.07 kg/hd/d, respectively. Results from these preliminary experiments support the use of BovaZyme in a complete mineral supplement as a value-added bloat mitigation chemistry. Further research is warranted across multiple years to validate the results of this research.

Key Words: biofilm

34 Individual ad libitum intake of mineral mix by beef cows is less than NRC recommendations and form of selenium (Se) in mineral mix affects Se levels of cows and suckling calves. J. D. Patterson*, W. R. Burris, J. A. Boling, and J. C. Matthews, *University of Kentucky, Lexington.*

This project was conducted to determine (1) individual ad libitum intake of mineral mix by beef cows managed under a year-long, fall-calving, forage-based production regimen and (2) if form of Se in mineral mix affected blood Se levels of cows and suckling calves. In August 2011, 24 late-gestation (6 to 8 mo) Angus-cross cows (2.7 ± 0.8 yr; BW = 585 ± 58 kg) were blocked by BW and randomly assigned (n = 8) to a mineral supplement treatment (TRT) containing 35 ppm Se as either inorganic (ISe; sodium selenite), organic (OSe; SEL-PLEX), or a 1:1 combination of ISe:OSe (Mix). Cows commonly grazed a 10.1 ha Kentucky-31 tall fescue pasture and had individual ad libitum access to TRT using an in-pasture Calan gate system. Cows calved from September to November and calves had common ad libitum access to creep feed and a mineral supplement that lacked Se. Cow jugular blood was taken at 28-d intervals (13 periods) and calf blood taken with cows' from birth through weaning. Data were analyzed using mixed models with main effects of experimental period, TRT, and their interaction evaluated. Main effect means were separated using the pdiff option. Pearson's partial correlation coefficient was calculated to assess linear associations between cow and calf blood Se levels. Cow mineral intake (g/d) was affected ($P < 0.0001$) by period, with Periods 1–3 (92.2 ± 6.7) > Periods 4, 9, 12 (56.3 ± 7.0) > Periods 5–8, 10, 11 and 13 (36.2 ± 6.9); but not ($P = 0.24$) by cow Se TRT. Cow blood Se (0.115 to 0.229 ± 0.01 μg/mL) was affected by Period ($P < 0.0001$), Se form ($P = 0.001$), and their interaction ($P = 0.03$), with ISe = Mix < OSe for Periods 3, 7, 8, 10, 12; ISe < Mix < OSe for Periods 9 and 11; and ISe = Mix = OSe for Periods 1, 2, 4–6. Calf blood Se (μg Se/mL) was correlated (r = 0.63, $P = 0.0001$) with cow blood Se and was affected by ($P < 0.0001$) cow Se TRT, with ISe (0.07 to 0.11) < Mix (0.10 to 0.15) = OSe (0.16 to 0.19). In conclusion, ad libitum cow mineral intake (54.7 g/d) was 36% less than NRC recommendations (85 g/d) and cow Se TRT affected cow and calf blood Se levels.

Key Words: cow, mineral intake, selenium

35 Effects of dietary ferric ammonium citrate on performance and carcass quality of beef cattle fed 20, 40, or 60% distillers grains with solubles. M. E. Drewnoski[2], S. J. Morine*[1], and S. L. Hansen[1], *[1]Iowa State University, Ames, [2]University of Idaho, Moscow.*

Previously, the addition of ferric ammonium citrate (FAC) to high S diets was found to decrease hydrogen sulfide (H_2S) concentrations. The objective of this experiment was to determine the effects of feeding FAC to steers fed varying concentrations of dried distillers grains plus solubles (DDGS) on steer performance, mineral status, and carcass quality. Angus-cross steers (n = 128) were assigned to one of 6 treatments, composed of 3 concentrations of DDGS in the diet (20, 40, or 60% of diet DM; 0.28, 0.41, 0.54% dietary S respectively) and one of 2 levels of FAC (0 or 300 ppm of added Fe). Treatments were replicated in 5 pens (20, 40% DDGS) or 6 pens (60% DDGS). During the 98 d study H_2S concentrations were measured on d 0, 7, 14, 21, and 95 at 6 h post feeding. Steer DMI was linearly and quadratically affected ($P \leq 0.02$) by increasing inclusion of DDGS, with no differences between 20 and 40% DDGS-fed steers, and lesser DMI by 60% DDGS-fed steers. Steer ADG was linearly decreased ($P < 0.01$) as DDGS inclusion increased, primarily due to the lesser ADG of steers consuming 60% DDGS. Increasing DDGS linearly increased ($P < 0.01$) ruminal concentrations of H_2S. Inclusion of FAC did not affect ($P \geq 0.21$) ADG, DMI, G:F (study means: 1.67 kg/d, 11.05 kg/d, and 0.15, respectively) or ruminal H_2S concentrations. Inclusion of FAC or increasing DDGS did not affect ($P \geq 0.32$) ribeye area, backfat, or KPH. Inclusion of FAC tended to increase HCW ($P = 0.10$), while increasing DDGS linearly decreased HCW ($P = 0.03$). Increased inclusion of DDGS had a quadratic effect ($P = 0.03$; 423, 443, and 413 for 20, 40, and 60% DDGS, respectively) on marbling score, and the inclusion of FAC increased ($P = 0.05$) marbling score. Liver Cu averaged 233 ppm and tended ($P = 0.06$) to be decreased by increasing DDGS, and was decreased ($P < 0.01$) by FAC addition, but was not decreased to the point of deficiency. Results of this study suggest 40% DDGS is the optimal inclusion in finishing cattle diets and including FAC in diets does not affect steer gains, but may increase HCW and marbling scores of cattle fed high S diets.

Key Words: cattle, dried distillers grain, iron

36 Feeding ferric citrate to decrease risk of sulfur toxicity: effects on trace mineral absorption and trace mineral status of steers. M. E. Drewnoski*[2] and S. L. Hansen[1], *[1]Iowa State University, Ames, [2]University of Idaho, Moscow.*

We have previously shown that adding ferric Fe to diets in the form of ferric ammonium citrate will decrease ruminal hydrogen sulfide concentrations and thus may reduce risk of S toxicity when feeding elevated levels of S. However, Fe can have negative effects on absorption of other trace minerals such as Cu, Mn and Zn. Therefore, this study was designed to determine the effect of supplementing 300 mg/kg DM of ferric Fe in high S diets on trace mineral absorption and trace mineral status of cattle. Eighteen Angus cross steers (370 ± 9.5 kg) were individually fed 1 of 3 high concentrate diets: (1) a moderate sulfur diet (MS; 0.3% S), (2) a high sulfur diet (HS; 0.5% S), or (3) HS plus 300 mg/kg of ferric Fe from ferric ammonium citrate (HS+Fe). Steers were adapted to diets for 7 d in individual pens and then moved into metabolism crates for a 5 d crate adaptation followed by a 5-d period of total fecal collection to determine apparent absorption of Cu, Fe, Mn and Zn. Steers were then moved back to individual pens and fed diets for an additional 56 d to determine effects on performance. Liver biopsies were conducted before the start of the trial and again at the end of the trial to determine trace mineral status. During the collection period DMI was greater ($P < 0.02$) for MS than HS and HS+Fe, which did not differ ($P = 0.87$). However, the apparent absorption of Cu, Fe, Mn and Zn were not affected ($P \geq 0.14$) by treatment. Additionally, after 73 d of consuming diets there were no effects of treatment ($P \geq 0.28$) on liver concentrations of Zn, Mn or Fe. However, steers fed the MS had greater ($P < 0.01$) liver Cu (273 mg/kg DM) than did those fed HS or HS+Fe. Liver Cu of steers fed HS (156 mg/kg) did not differ ($P = 0.44$) from those fed HS+ Fe (136 mg/kg), suggesting that the reduced liver Cu was due to the increased dietary S. The 56 d ADG of steers did not differ ($P = 0.45$) among treatments and were 2.33, 2.15, 2.11 kg/d (SEM ± 0.125) for MS, HS and HS+Fe, respectively. In this study, feeding 300 mg/kg ferric Fe in a high S diet did not appear to affect trace mineral absorption or status of steers.

Key Words: copper, iron, sulfur

37 Phytonutrients or calcified marine algae as natural alternatives to monensin in beef feedlot diets. F. M. Hagg*[1,2], L. J. Erasmus[2], R. H. Van der Veen[1], E. Haasbroek[2], S. Taylor[3], and C. Oguey[4], *[1]Allied Nutrition, Pretoria, South Africa, [2]University of Pretoria, Pretoria, South Africa, [3]Celtic Sea Minerals, Cork, Ireland, [4]Pancosma, Geneva, Switzerland.*

Public concern regarding possible antibiotic resistance led to the evaluation of a mixture of phytonutrients (XT) containing capsicum oleoresin, cinnamaldehyde and eugenol, and a commercial buffer (AB), containing *Lithothamnium calcareum* (calcified marine algae), as natural alternatives to monensin (MON) in beef cattle. The objective of the study was to determine if XT or AB can successfully replace MON in commercial beef feedlot diets. In Trial 1 (Experimental trial) 180 recently weaned male beef cattle (±225 kg) were randomly allocated to one of 3 treatments: 1) Monensin (21 – 33 mg/kg DM); 2) XT (XTRACT 7065, Pancosma) at 1.0 – 1.2 g/head/day; 3) AB (Acid Buf; Celtic Sea Minerals) at 0.6% of DM. Same basal diets (ME = 10.6 – 11.7 MJ/kg DM) were used during 4 different feeding periods, with only MON, XT or AB inclusion differing between diets. Six pens, with 10 animals each, were randomly allocated to each treatment for a period of 119 d. In Trial 2 (Commercial trial), 1170 recently weaned male beef cattle (±225 kg) were used in a similar design, but for each treatment 3 pens, with 130 cattle per pen, were randomly allocated, with a trial period of 115 d. Growth, feed intake and health parameters were measured. Statistical analyses were done with one-way ANOVA (ANOVA). In Trial 1 there were no differences ($P > 0.05$) in DMI, FCR or ADG between treatments. In Trial 2, ADG was increased (1.77 vs. 1.70 kg/d) when XT replaced MON ($P < 0.05$) and there was a tendency ($P = 0.09$) toward improvement of ADG when AB replaced MON. DMI tended to be increased ($P = 0.09$) by XT (10.05 kg/d) compared with MON (8.96 kg/d). Overall performance expressed as FCR was not affected when either AB or XT replaced MON ($P > 0.2$). Percentage of healthy animals was reduced ($P < 0.05$) when AB replaced MON, however growth performance was not impaired. Percentage of healthy rumens was improved ($P < 0.01$) when either XT (76.3%) or AB (49.2%) replaced MON (27.1%). Results suggest that both XT and AB could be used to replace MON in commercial beef feedlot diets without impairing animal performance.

Key Words: calcified marine algae, monensin, phytonutrients

38 Interaction between supplemental zinc and zilpaterol in feedlot steers. C. L. Van Bibber-Krueger*, K. A. Miller, C. C. Aperce, C. A. Alvarado-Gilis, J. M. Gonzalez, and J. S. Drouillard, *Kansas State University, Manhattan.*

Interactive effects of supplemental zinc (Zn) and zilpaterol hydrochloride (Zil) were evaluated in feedlot steers (n = 40; initial BW 653 kg ± 14) to determine the effect on feedlot performance, blood constituents, and carcass traits. The study was conducted as a randomized complete block with a 2 × 2 factorial treatment arrangement. Steers were blocked by BW and randomly assigned to treatments. Factors consisted of supplemental Zn (60 or 300 mg/kg), and Zil (0 or 8.3 mg/kg) concentrations in the diet. Zil was fed for 21 d followed by a 3-d withdrawal. Cattle were housed in partially-covered individual feeding pens equipped with automatic waterers, fence-line feed bunks and supplied an ad libitum diet once daily. Plasma samples were collected d 0 and 21 to assess changes in zinc, urea nitrogen (PUN), glucose, and lactate concentrations, and serum samples were collected d 21 to assess IGF-1 concentration. On d 24 cattle were weighed, transported 450 km to a commercial abattoir for harvest, and HCW and incidence of liver abscesses were recorded. Carcass data were collected after 24 h of chilling. Data were analyzed as a mixed model with Zn, Zil, and Zn × Zil as fixed effects, block as a random effect, and steer as the experimental unit. No interaction or effects of Zn or Zil ($P > 0.05$) were observed for IGF-1 concentration. Interactions between Zn and Zil were observed for changes in plasma glucose and lactate ($P < 0.05$). No interaction between Zn and Zil was observed for PUN concentration, but PUN decreased over time with Zil ($P < 0.05$). There were no effects of Zil or Zn on ADG, DMI, final BW, feed efficiency, HCW, LM area, backfat, KPH, quality grade, or incidence of liver abscesses ($P > 0.05$), though Zn numerically improved marbling and tended ($P = 0.08$) to improve proportion of carcasses grading USDA Choice. Feeding Zil decreased yield grade ($P < 0.05$) without compromising marbling score ($P > 0.05$) and tended to increase LM area ($P = 0.07$). In conclusion, increasing dietary concentrations of zinc does not affect response to zilpaterol, but feeding zilpaterol alters circulating concentrations of blood constituents associated with muscle accretion.

Key Words: IGF-1, lactate, plasma urea nitrogen

39 Influence of supplementing vitamin C to cattle fed a high sulfur diet late in the finishing period on meat color and tenderness. D. J. Pogge*, S. M. Lonergan, and S. L. Hansen, *Iowa State University, Ames.*

The objective of this study was to determine the effects of supplementing a rumen-protected vitamin C (VC) for approximately 102 d before harvest on meat color, tenderness, and nutrient content of longissimus dorsi (LD) collected from cattle receiving a 0.55% S diet. Angus-cross steers (n = 140) were blocked by initial BW (432 ± 0.4 kg), stratified within blocks by ultrasonographic initial intramuscular fat (3.6% ± 0.06), and assigned to treatments (5 steers per pen, 7 pens per treatment), including: 1) no VC control (CON), 2) 5 g VC·h^{-1}·d^{-1} (5VC), 3) 10 g VC·h^{-1}·d^{-1} (10VC), and 4) 20 g VC·h^{-1}·d^{-1} (20VC). Cattle were harvested by block on d 91 (n = 40), d 105 (n = 40), and d 112 (n = 60). Three, 1.27 cm steaks (n = 136) were removed from each carcass after a 24 h chill. One steak was displayed under retail-simulated lighting at 2°C and color analysis was conducted on d 1, 2, 3, and 7; and after 7-d of display Warner-Bratzler shear force (WBSF) was determined. Separate steaks were analyzed for hydroxyproline, VC, vitamin E (VE), and cholesterol. For all analyses pen (n = 7 per treatment) was the experimental unit. The supplemental VC intake (g·h^{-1}·d^{-1}) averaged 5.1 (5VC), 10.1 (10VC), and 20.2 (20VC). Inclusion of VC resulted in a lesser ($P < 0.01$) L* than CON, and VC supplemented treatments did not differ from one another ($P \geq 0.46$). No differences among treatments ($P \geq 0.30$) in WBSF values, a* and b*, or hydroxyproline content of LD muscle were noted. However, WBSF values tended to be negatively correlated with a* ($R = -0.33$; $P < 0.08$). The VC content of the LD was not different ($P \geq 0.48$), but the inclusion of VC increased ($P < 0.01$) VE content of LD compared with CON (1.24, 1.71, 1.45, and 1.53 µg/g tissue ± 0.07, for CON, 5VC, 10VC, and 20VC, respectively). Cholesterol content of LD demonstrated a quadratic response ($P < 0.01$), CON (54.4), 5VC (57.4), 10VC (59.8), and 20VC (54.9 mg/100 g ± 1.4). Under the conditions of our study, supplementation of VC to steers fed a high S diet late in the finishing period did not influence color stability or WBSF, but increased VE content of LD.

Key Words: cattle, sulfur, vitamin C

40 Effect of a supplemental zinc complex on beef cattle performance and plasma and liver trace mineral concentrations. O. N. Genther* and S. L. Hansen, *Iowa State University, Ames.*

The objective of this experiment was to determine the effect of a supplemental zinc (Zn) complex (ZnC) on steer performance and plasma and liver trace mineral concentrations. Forty-one steers (380 ± 5.3 kg) were fed a finishing diet of 61% ground corn, 23% dried distillers, 14% corn silage, 2% micronutrients, and 60 mg supplemental Zn/kg diet DM (as Zn sulfate). Steers were assigned to 1 of 4 treatments for 86 d: Zn0: no supplemental ZnC (n = 6), Zn30: 30 mg Zn/kg from ZnC (n = 12), Zn60: 60 mg Zn/kg from ZnC (n = 12), and Zn90: 90 mg Zn/kg from ZnC (n = 11). Individual DMI was recorded daily, body weights were taken on d 0, 1, 28, 56, and 86, and ultrasound measurements were taken on d 0 and 86. Steer was the experimental unit and DMI, ADG and G:F were analyzed as repeated measures. Steer DMI (11.3, 11.4, 11.0 and 11.0 ± 0.17 kg for Zn0, Zn30, Zn60 and Zn90, respectively) was not affected ($P > 0.20$) by treatment. However, Zn60 ADG was greater (2.2 kg/d) than Zn90 (1.9 kg/d; $P < 0.05$), tended to be greater than Zn30 (1.98 kg/d; $P < 0.10$) and was not different from Zn0 (2.05 ± 0.07 kg/d; $P > 0.10$). The Zn60 steers had greater G:F and final BW than Zn30 and Zn90 (G:F: 0.197, 0.174 and 0.168 ± 0.007, respectively; $P < 0.05$; final BW: 571, 547, 543 ± 5.6 kg, respectively; $P < 0.05$), and were not different from Zn0 (G:F: 0.180 ± 0.008; $P > 0.10$; final BW: 554 ± 7.8kg; $P > 0.10$). Day 86 ultrasound-determined ribeye area and intramuscular fat were not affected by treatment ($P > 0.20$). Steers receiving the Zn60 diet had greater d 86 back fat than Zn90 (1.47 and 1.17 cm, respectively; $P < 0.05$) but were not different from Zn0 and Zn30 (1.32 and 1.32 ± 0.07 cm, respectively; $P > 0.10$). Plasma Cu and Fe, and liver Zn and Cu concentrations were not affected by treatment ($P > 0.20$). Plasma Zn tended ($P < 0.10$) to be higher in Zn90 than Zn0 and Zn60 (1.48, 1.30, 1.35 ± 0.04 mg/L, respectively) and no treatments were different from Zn30 (1.44 mg/L). During the 86 d finishing period Zn60 steers performed better than Zn30 or Zn90, and were similar to Zn0 steers.

Key Words: cattle, growth, zinc

41 Influence of lipid-extracted algae on intake and digestibility of a concentrate diet. M. K. Beckman*, L. N. Tracey, C. L. Shelley, K. L. Norman, K. H. Marchetti, E. J. Scholljegerdes, C. A. Löest, S. A. Soto-Navarro, and S. L. Ivey, *New Mexico State University, Las Cruces.*

The co-product resulting from the oil extraction of microalgae, intended for biofuel production, may be of interest to ruminant producers as a proteinaceous feedstuff. The objective of this study was to determine the influence of lipid extracted algae (LEA) on feed intake and digestibility of a concentrate diet. We hypothesized that an isonitrogenous addition of LEA in a concentrate diet fed to sheep would yield results similar to that of dried distillers grains with solubles (DDGS). Fifteen crossbred wether lambs (46 ± 7.1 kg BW), fitted with ruminal and duodenal can-

nulas, were used in a completely randomized design. Lambs were fed twice daily at 110% of previous 3 d DMI. Treatments included: 1) lipid extracted algae diet (CP 16.3%; NDF 23.4%, DM basis; ALGAE) and 2) dried distillers grains with solubles diet (CP 15.7%; NDF 22.3%, DM basis; DGS). Animals were adapted to treatments for 10 d followed by a 6 d sample collection period. Treatment did not influence OM, NDF, or CP intake ($P \geq 0.21$). Ruminal and total tract OM digestibility was lower in animals consuming ALGAE compared with DGS (78.6 vs 83.6 ± 1.77%, $P = 0.05$ and 81.0 vs 86.8 ± 1.38%, $P < 0.01$, respectively). There was no treatment influence on lower tract OM digestibility ($P = 0.93$). Ruminal N digestibility was unaffected by treatment ($P > 0.10$), however N digestion in the total tract was lower for sheep fed ALGAE versus DGS (76.0 vs 86.1 ± 1.49%; $P < 0.01$). Additionally, total tract NDF digestion was greater for DDGS treated lambs, than for those consuming LEA (76.6 vs 70.5 ± 2.19%; $P = 0.05$). There was a tendency ($P = 0.09$) for ALGAE fed animals to show increased microbial efficiency over those fed DGS. Ruminal pH, NH_3, and VFA concentrations did not differ by treatment ($P \geq 0.34$). These data may indicate that LEA is palatable in ruminant diets. However, reduction in digestibility of OM, N and NDF when LEA is added compared with DDGS is concerning and warrants further investigation.

Key Words: biofuel, digestibility, sheep

42 The effect of *Aspergillus oryzae* extract on feedlot performance and carcass merit in yearling steers fed steam-flaked corn based finishing diets. K. A. White*[1], J. J. Wagner[1], T. E. Engle[1], D. R. Woerner[1], R. K. Peel[1], T. C. Bryant[2], J. S. Jennings[3], and K. M. Brennan[3], *[1]Animal Sciences Department, Colorado State University, Fort Collins, [2]JBS Five Rivers Cattle Feeding, Greeley, CO, [3]Alltech Inc., Nicholasville, KY.*

Crossbred yearling steers (n = 270) averaging 319 ± 7.11 kg initial BW were utilized in a randomized block design experiment to evaluate the effects of supplementing a steam-flaked corn based finishing diet with *Aspergillus oryzae* extract containing α-amylase activity on feedlot performance and carcass characteristics. Steers were ranked by weight and allocated into 15 weight block replicates. Within each weight block replicate, steers were randomly assigned to 1 of 2 treatments resulting in 9 steers per pen. Treatments consisted of: 1. Amaize (AMZ; 5 g/head daily providing 750 fungal α-amylase units/g, Alltech Inc. Nicholasville, KY) and 2. Control (CON; providing 5 g/head daily of a corn meal placebo). All cattle were fed for 149 d and 2 individual and 1 pen weight were collected on d 32, 69, and 105, respectively. Final BW and ADG were similar ($P > 0.10$) across treatments. Dry matter intake and gain to feed (G/F) ratios were similar ($P > 0.10$) across treatments throughout the entire study. From d 106 through slaughter, there was a tendency ($P > 0.11$) for G/F ratio to be greater for AMZ supplemented cattle as compared with CON. Hot carcass weight was similar ($P > 0.60$) across treatments. The distribution of HCW among light, average, and heavy weight categories ($P > 0.75$) and longissimus muscle area ($P = 0.17$) did not vary by treatment. Fat depth over the 12th rib ($P = 0.06$, 1.24 vs. 1.35 cm) and Yield grade calculated from carcass measurements ($P = 0.12$, 2.81 vs. 2.98 units) tended to be lower while dressing percentage tended ($P = 0.06$, 63.0 vs. 62.6%) to be greater for the AMZ vs. CON supplemented cattle. Liver abscess rates were lower ($P < 0.01$) for CON (3.8%) vs. AMZ (15.8%) supplemented cattle. Under the conditions of this experiment, results indicate that AMZ supplementation has minimal effects on live cattle performance but may improve dressing percentage.

Key Words: amylase, beef feedlot, carcass merit

43 Effect of supplementing gestating and lactating beef cows with supranutritional concentrations of vitamin D on cow production and pre-weaning growth of the calf. J. P. Schoonmaker*[1], M. Engstrom[2], K. N. Condron[1], C. N. Shee[1], and R. P. Lemenager[1], *[1]Purdue University, West Lafayette, IN, [2]DSM Nutritionals, Parsippany, NJ.*

Angus × Simmental cows (n = 156, age = 4.7 yr, BW = 639 ± 12.4 kg, BCS = 5.2 ± 0.07) were allotted by BW, BCS, and breed to 4 treatments to determine the effect of supranutritional vitamin D during gestation and/or lactation on milk production and composition, reproductive efficiency, and pre-weaning progeny growth. At 173 d in gestation, cows were allotted to 2 pastures and fed a molasses based vitamin/mineral block formulated to provide 6300 IU D daily (LD) or 100,000 IU D daily (HD). At the mid-point of calving season cows were placed on lactation treatments and fed LD or HD in drylot. Treatments were arranged as a 2 × 2 factorial: LD in gestation, followed by LD (LDLD) or HD (LDHD) in lactation, or HD in gestation followed by LD (HDLD) or HD (HDHD) in lactation. Treatments concluded at breeding (79 d postpartum; DPP) and cattle were commingled and managed as a group until weaning which occurred at 188 DPP. At 69 and 79 DPP milk production and composition was assessed on 10 cows per treatment. Categorical and continuous data were analyzed with the GLIMMIX and MIXED procedures of SAS, respectively. Cows fed HD during gestation were 29.6 kg heavier at the end of the gestation period ($P = 0.02$), whereas cows fed HD during lactation were 26.0 kg lighter at study termination ($P = 0.04$). Cow weight at weaning ($P > 0.69$) and BCS ($P > 0.29$) did not differ. Conception rates were lowest for LDHD cows (interaction, $P = 0.04$) and overall pregnancy rates tended ($P = 0.06$) to be greater for cows fed HD during gestation. Milk production was lower ($P = 0.03$) for cows fed HD during gestation but did not differ due to D during lactation ($P = 0.79$). Milk protein was lowest for LDHD cows (interaction; $P = 0.01$). Milk fat tended ($P = 0.10$) to be lower for cows fed HD during lactation. Calf birth weight did not differ among treatments, however, HD during gestation tended to decrease calving difficulty ($P = 0.07$) and to produce heavier calves at weaning ($P = 0.08$). In conclusion, feeding supranutritional D during gestation improves cow weight and reproductive efficiency and may benefit the offspring.

Key Words: beef, developmental programming, vitamin D