M55 Effects of *Saccharomyces cerevisiae* fermentation product on ruminal VFA production when supplemented to various beef feedlot diets. I. Yoon*, C. Belknap, J. Butler, J. Lin, A. Brainard, and T. Werner, *Diamond V, Cedar Rapids, IA.*

Feedlot rations vary greatly in both ingredient and nutrient composition depending on the type of animal being fed, stage of production, feeding objective, feed manufacturing capabilities and availability of feedstuffs. An in vitro study was performed to determine the effects of *Saccharomyces cerevisiae* fermentation product (Diamond V Original XPC, XPC) on ruminal VFA production when supplemented to beef feedlot diets obtained from major beef cattle production areas in the US Feedlot diets collected and tested include: finishing diets from feedyards in Illinois (IL), Nebraska (NE1 and NE2), and Texas (TX1), and a backgrounding diet from a feedyard in Texas (TX2). Rations represented a cross-section of ingredients commonly used within the industry. Rumen inocula were obtained from 2 cannulated cows and pooled on an equal volume basis. Forty milliliters of a 1:20 ruminal fluid-to-buffer solution were introduced into 100 mL fermentor bottles containing 0.25 g of diet supplemented with 0.15 g (DM basis) of either XPC or control grain used in production of XPC and incubated for 12 and 24 h at 39°C (n = 10 per treatment). After the 12 h fermentation, XPC increased ($P < 0.05$) propionate and total VFA across all diets compared with the Control. Acetate production was higher ($P < 0.05$) with XPC in the IL, NE1 and TX2 diets. After the 24 h fermentation, XPC increased ($P < 0.05$) propionate across all diets. Total VFA was increased ($P < 0.05$) in the NE1 and NE2 diets. Diamond V Original XPC improves rumen fermentation across a wide variety of feedyard diets, resulting in consistently higher propionate concentrations.

Table 1. Effect of Original XPC on percent increase in VFA production versus Control[1]

	IL	NE1	NE2	TX1	TX2
12 h fermentation					
Acetate	**6.8**	**7.9**	3.2	**4.9**	**8.5**
Propionate	**28.4**	**29.3**	**18.3**	**22.8**	**20.5**
Total VFA	**14.1**	**15.1**	**9.5**	**11.6**	**13.4**
24 h fermentation					
Acetate	4.3	**7.9**	3.2	−0.2	1.9
Propionate	**8.7**	**13.2**	**8.0**	**5.4**	**7.5**
Total VFA	5.4	**9.2**	**5.6**	1.9	4.0

[1]Bold values represent significant percent difference versus Control at $P < 0.05$.

Key words: feedlot diets, yeast culture, in vitro fermentation

M56 Body components on finishing crossbred beef heifers of different residual feed intake groups. S. F. Reis*[1], P. V. R. Paulino[1], S. R. Medeiros[2], G. L. D. Feijó[2], R. A. A. Torres Júnior[2], D. A. Fausto[3], M. A. Rezende[2], and S. C. Valadares Filho[1], *[1]Universidade Federal de Viçosa, Viçosa, Minas Gerais, Brazil, [2]Embrapa Gado de Corte, Campo Grande, Mato Grosso do Sul, Brazil, [3]Universidade de São Paulo, Piracicaba, São Paulo, Brazil.*

Studies have suggested that 37% of the total variation in the residual feed intake (RFI) would be related to energetic expenditure with metabolism of the tissues (mainly liver and gastrointestinal tract). This trial aimed to evaluate the weight of body components (non-carcass) of 31 3-cross beef heifers finished in feedlot, fed with same diet, during 84 d. The animals were classified in 3 groups according to their RFI value (high, medium or low). The RFI was calculated as the difference between an animal′s actual and predicted feed intake. The actual dry matter intake was obtained daily during 84 d of feedlot and the predicted feed intake according to the equation: $-3.82593 + 0.15438 \times MBW + 1.09531 \times ADG$. At the end of 84 d all animals were slaughtered using conventional humane procedures. The blood was weighed and the body was separated into individual components, which were separately weighed. Included were internal organs (liver, heart, lungs, trachea, kidneys, reproductive tract, and spleen), cleaned digestive tract (rumen, reticulum, omasum, abomasum, and small and large intestines), tongue, tail, hide, head, feet, and carcass. The trial was conducted in a completely randomized design and data were analyzed using the PROC GLM of SAS ($\alpha = 0.05$). The classes of RFI were different for DMI kg/d ($P < 0.05$), the means were: 12.61(high RFI); 11.72 (medium RFI) and 11.00 (low RFI). No differences were found among classes of RFI for the body components evaluated in percentage of empty body weight (EBW) or in kg/d ($P > 0.05$). The overall averages were: 20.32% EBW (organs and viscera); 6.85% EBW (visceral fat); 289 kg (initial EBW), 415.33 kg (final EBW), and 1.22 kg/d (EBW gain). Viscera and internal organs are largely responsible for energy expenditure in ruminants suggesting a role in feed efficiency determination. No difference in the liver weight ($P > 0.05$) among RFI classes was found. The means measured for high and low RFI were respectively 1.41% EBW and 1.36% EBW. Body components (non carcass) do not differ among finishing crossbred beef heifers of different RFI classes, other factors associated with metabolism may have greater influence on feed efficiency.

Key words: beef cattle, net feed intake, internal organs

M57 Finishing steers and bulls with high-vitamin E diets: Effect on circulating immune cells and creatine kinase at time of slaughter. C. Reyes, C. Fuentes, and R. E. Larraín*, *Pontificia Universidad Catolica de Chile, Santiago, Chile.*

Release of glucocorticoids to the blood stream after stress may change the number of immune cells circulating in blood within minutes. A stressful event may also increased creatine kinase (CK) in blood if muscle tissue is damaged or mobilized. Vitamin E reduced activation of the hypothalamic-hypophysis-adrenocortical axis in farm animals, so the objective of this study was to test if finishing bovines with a high vitamin E diet modulate changes in immune-cells counts and CK at time of slaughter. Thirty-eight steers and bulls were blocked by sex, then grouped in 16 pens of 2 or 3 animals of similar weight, and randomly assign to 1 of 2 treatments: a control diet design to provide 60 IU vitamin E•animal^{-1}•day^{-1} and the control diet supplemented with 2000 IU vitamin E•animal^{-1}•day^{-1}. Each pen was considered an experimental unit (n = 8). Feed was offered once daily to each pen to provide ad libitum access to feed. A blood sample was taken by jugular venipuncture at d 0 to be used as baseline for CK. After 123 d on feed, animals were transported for about 1.5 h to a local slaughterhouse and killed approximately 8 h after arrival. A sample of trunk blood was taken at the time of slaughter. Factors in the model were sex and treatment, and initial weight was included as covariate. Differences were considered significant when ANOVA had $P < 0.05$. We observed no changes in any of the variables analyzed, concluding that feeding 2000

IU vitamin E•animal^{-1}•day^{-1} produced no changes in immune cells counts and CK at time of slaughter.

Table 1. Immune cells (cells/μL) and creatine kinase (CK, U/L) after slaughter in bovines fed vitamin E

Item	Control	Vitamin E	*P*-value
Leucocytes	9,329 ± 591	9,298 ± 586	0.98
Bacilliforms	30.3 ± 13.2	53.9 ± 13.0	0.19
Neutrophils	4,840 ± 331	4,823 ± 328	0.97
Lymphocytes	4,149 ± 351	4,305 ± 348	0.74
Monocytes	65.7 ± 24.9	45.6 ± 24.7	0.55
Eosinophils	124 ± 55.2	124 ± 54.7	0.99
Basophiles	29.5 ± 13.0	24.2 ± 12.9	0.76
Change in CK from d0	751 ± 239	735 ± 237	0.96

Vitamin E: 2000 IU•animal^{-1}•day^{-1}.

Key words: vitamin E, immune cells, creatine kinase

M58 Vitamin D_3 effect on metabolite levels in plasma and longissimus musle of steers fed zilpaterol hydrochloride. K. T. Korn*, M. C. Claeys, R. P. Lemenager, and J. P. Schoonmaker, *Purdue University, West Lafayette, IN.*

Two hundred and ten Angus × Simmental steers (init. BW 314 ± 11 kg) were allotted by BW to a 3 × 2 factorial arrangement of 6 treatments (5 pens per treatment; 3 heavy, 2 light blocks) to determine the effect of supplemental vitamin D_3 (0 IU [none], 250,000 IU for 165 d [long-term D], or 5×10^6 IU for 10 d [short-term D]) on plasma total calcium and tissue vitamin D and total calcium levels in steers fed 0 or 8.38 mg/kg zilpaterol hydrochloride (Zilmax) daily for 21 d. Steers were implanted with Revalor XS and fed a growing phase diet (30% corn silage, 20% distillers grains, 1150 IU/kg vitamin D) for 54 d. Finishing phase diets (15% corn silage, 20% distillers grains, 750 IU/kg vitamin D) were fed for 111 d. Zilmax or placebo was added to the diet 24 d and short-term D was added 13 d before slaughter. Treatments were removed from all diets 3 d before slaughter. Plasma was collected at the start of the experiment (0 d), the introduction of Zilmax to the diet (141 d), the start of short-term D (152 d), the withdrawal of treatments (162 d), and the day before harvest (165 d). Longissimus muscles were collected and ground for total calcium and vitamin D analysis. Kidney and liver were collected for vitamin D_3, 25-hydroxyvitamin D_3, and 1,25 dihydroxyvitamin D_3 determination. Short-term D increased ($P < 0.01$) total calcium in plasma at the 162 and 165 d time points compared with none or long-term D. Zilmax increased plasma total calcium at 162 d in steers fed short-term D but not in steers fed long-term D or not fed D (interaction, $P < 0.01$). At 165 d, Zilmax did not increase plasma total calcium in steers fed long or short-term D, but tended ($P = 0.06$) to increase total calcium when steers were not fed supplemental vitamin D (interaction, $P < 0.01$). In conclusion, Zilmax affects plasma total calcium levels depending on dietary concentrations of vitamin D. However, total plasma calcium concentrations do not explain changes in tenderness after 21 d of aging seen previously for Zilmax and long-term D feeding.

Key words: beef, vitamin D, zilpaterol hydrochloride

M59 Early metabolic imprinting events increase marbling scores in fed cattle. M. A. McCann*[1], J. M. Scheffler[1], S. P. Greiner[1], M. D. Hanigan[2], G. A. Bridges[3], S. L. Lake[4], J. M. Stevenson[1], H. Jiang[1], T. L. Scheffler[1], and D. E. Gerrard[1], *[1]Dept. of Animal and Poultry Sciences, Virginia Polytechnic Institute and State University, Blacksburg, [2]Dept. of Dairy Science, Virginia Polytechnic Institute and State University, Blacksburg, [3]University of Minnesota, North Central ROC, Grand Rapids, [4]Dept. of Animal Sciences, University of Wyoming, Laramie.*

Early weaning of calves to a high concentrate diet results in greater fat deposition and suggests that postnatal metabolic imprinting events that may be exploited as a management tool to improve cattle value. The objective of this study was to determine the ability of a short, high energy dietary intervention for subsequently increasing intramuscular fat deposition in finishing cattle. Twenty 4, fall-born Angus-sired steer calves from primiparous cows were stratified by sire and randomly assigned to normal weaned (NW) or metabolic imprinted (MI) treatments. NW calves remained on their dam until 251 ± 6 d of age, whereas MI calves were weaned at 105 ± 6d (135kg) and were transitioned to a diet containing 20% CP and 1.26 Mcal/kg NEg. MI calves were offered 1.0 kg/d of grass hay and were hand-fed twice daily to approximate ad libitum intake. CP levels of the diet were transitioned from the initial level of 20% to 14.5% through the course of the feeding period. Seven days post-weaning of the NW both treatment groups were combined and grazed on a mixed summer pasture from mid-May until early Oct. Post-grazing, steers were adapted to a corn silage-based feedlot diet and performance monitored on a 28-d interval. Ultrasound fat was determined after 75d on feed to stage harvest groups with an estimated 1.0–1.2 cm of backfat. Cattle were harvested and carcass measurements were recorded 24h postmortem. MI calves were heavier ($P < 0.05$) than NW calves (341 vs. 265 kg) at normal weaning age. During the grazing phase NW steers gained more weight than ($P < 0.05$) MI steers (0.69 vs. 0.35 kg/d). Feedlot performance, BF and USDA yield grade were similar between treatments. However, MI steers produced heavier ($P < 0.05$) carcasses (564 vs. 524 kg) with a higher ($P < 0.001$) marbling scores (645 vs. 517; 400 = Sm^0, 500 = Md^0 and 600 = Mt^0). Calves consuming a high concentrate diet for a short period of time early postnatal yielded a higher quality carcass and suggest that metabolic imprinting mechanisms exist in growing beef cattle and may be used for economic gain by cattle producers and feedlot managers.

Key words: calf, weaning age, pasture