Meat Science and Muscle Biology: Effects of Nutrients and Supplements on Animal Growth Performance and Meat Quality

88 Effect of dietary vitamin D_3 supplementation on meat quality of naked neck chickens. M. Mabelebele*[1,2], J. W. Ngambi[2], D. Norris[2], and O. J. Alabi[2], *[1]University of New England, New South Wales, Armidale, Australia, [2]University of Limpopo, Polokwane, South Africa,*

Consumers' interest in indigenous chicken meat is increasing. An experiment was conducted to determine the effect of vitamin D_3 supplementation on meat quality of indigenous male naked neck chickens. Two hundred 13-wk-old male naked neck chickens with a mean live weight of 1200 ± 3 g were supplemented with vitamin D_3 levels of 0, 2000, 4000, 6000 and 8000 IU per kg dry matter (DM) of feed for a period of 7 d before slaughter. A 2 (postmortem agings of 0 or 24 h) × 5 (vitamin D_3 levels) factorial arrangement in a complete randomized design was used for shear force and sensory evaluation of cooked chicken meat. Twenty chickens were used in each treatment. The meat samples were cooked and prepared according to an oven-broiling method using direct radiant heat. A quadratic equation was used to determine vitamin D_3 supplementation levels for optimum shear force value and sensory attributes. Vitamin D_3 supplementation and Vitamin D_3 and postmortem aging interaction did not improve ($P > 0.05$) shear force values of unaged or aged cooked naked neck chicken meat. Shear force values of unaged and aged cooked meat were optimized at different levels of 2512 ($r^2 = 0.669$) and 4249 ($r^2 = 0.873$) IU of vitamin D_3 per kg DM feed, respectively. Vitamin D_3 supplementation and its interaction had no effect ($P > 0.05$) on unaged meat tenderness, juiciness and flavor. However, vitamin D_3 supplementation improved ($P < 0.05$) aged meat tenderness and flavor. Postmortem aging did not improve ($P < 0.05$) sensory attributes of naked neck chicken meat. Tenderness, juiciness and flavor of aged naked neck chicken meat were optimized at supplementation level of 6830 ($r^2 = 0.839$), 6894 ($r^2 = 0.683$) and 9795 ($r^2 = 0.657$) IU of vitamin D_3 per kg DM. It was concluded that vitamin D_3 supplementation improved tenderness and flavor of aged naked neck chicken meat, however, shear force was not improved.

Key Words: shear force, postmortem aging, sensory attributes

89 Effects of supplemental lysine and methionine with zilpaterol hydrochloride on feedlot performance, carcass characteristics on finishing feedlot cattle. A. D. Hosford*[1], W. Rounds[2], J. E. Hergenreder[1], M. J. Anderson[2], M. A. Jennings[1], T. L. Harris[1], S. N. Aragon[1], and B. J. Johnson[1], *[1]Department of Animal and Food Science, Texas Tech University, Lubbock, [2]Kemin Industries Inc., North America, Des Moines, IA.*

Feeding zilpaterol hydrochloride (ZH) with encapsulated amino acids (AA) was evaluated in a feeding trial. Crossbred steers (n = 180; initial BW = 366 kg) were blocked by weight and then randomly assigned to treatments (45 pens; 9 pens/treatment). Treatment groups consisted of: no ZH and no AA (Cont−), ZH and no AA (Cont+), ZH and an encapsulated lysine supplement (Lys), ZH and an encapsulated methionine supplement (Met), and ZH and encapsulated lysine and methionine Lys+Met, (LysiPEARL, MetiPEARL). Zilpaterol hydrochloride (8.3 mg/kg DM basis) was fed for the last 20 d with a 3 d withdrawal. Lysine and Met were top dressed daily for the 134-d feeding trial to provide 12 and 4 $g \cdot hd^{-1} \cdot d^{-1}$, respectively, to the small intestine. Carcass characteristics were collected following harvest. Cattle treated with Met and Lys+Met had increased final BW of 15 and 14 kg ($P = 0.02$ and 0.03) as compared with Cont−. Average daily gain increased ($P < 0.05$) for Met and Lys+Met fed cattle as compared with Cont− and Cont+ for the entire 134 d feeding period. The supplementation of Lys, Met and Lys+Met improved G:F ($P < 0.05$) as compared with Cont− during the ZH feeding period (d 111 to 134) as well as the entire feeding period ($P < 0.05$). Zilpaterol hydrochloride increased carcass ADG ($P < 0.05$) when compared with non-ZH fed cattle. Lysine + methionine treated cattle tended to have increased carcass ADG ($P = 0.09$) as compared with Cont+. Methionine and Lys+Met treatments had heavier hot carcass weight (HCW, $P < 0.05$) as compared with Cont−. Yield grade was decreased ($P < 0.05$) for Cont+ cattle compared with Lys, Lys+Met, and Cont− treated cattle. There was a higher proportion of yield grade one carcasses ($P < 0.05$) with Cont+ treatment compared with any AA treatment. Supplementation of Met in conjunction with ZH feeding increased ADG and HCW. These findings indicated that cattle fed ZH may require additional AA absorbed from the small intestine to maximize performance, and supplementing encapsulated AA may actually increase the ZH response as compared with ZH alone.

Key Words: beef cattle, lysine/methionine, zilpaterol hydrochloride

90 Effects of supplemental lysine and methionine with zilpaterol hydrochloride administration on finishing feedlot cattle tenderness. A. D. Hosford*[1], W. Rounds[2], J. E. Hergenreder[1], M. J. Anderson[2], M. A. Jennings[1], T. L. Harris[1], S. N. Aragon[1], and B. J. Johnson[1], *[1]Department of Animal and Food Science, Texas Tech University, Lubbock, [2]Kemin Industries Inc., North America, Des Moines, IA.*

Steaks from beef steers that were fed encapsulated amino acids and zilpaterol hydrochloride were tested for tenderness using the Warner Bratzler shear force (WBSF) method. Crossbred steers (n = 180; initial BW = 366 kg) were blocked by weight and then randomly assigned to treatments (45 pens; 9 pens/treatment). Treatment groups consisted of: no ZH and no AA (Cont−), ZH and no AA (Cont+), ZH and an encapsulated lysine supplement (Lys), ZH and an encapsulated methionine supplement (Met), and ZH and encapsulated lysine and methionine Lys+Met, (LysiPEARL, MetiPEARL). Zilpaterol hydrochloride (8.3 mg/kg DM basis) was fed for the last 20 d with a 3 d withdrawal. Lysine and Met were top dressed daily for the 134 d feeding trial to provide 12 and 4 $g \cdot hd^{-1} \cdot d^{-1}$, respectively, to the small intestine. Cattle were slaughtered at a commercial facility and longissimus muscle samples were collected following fabrication. Four steaks (2.54 cm thick) from each strip loin were aged for 7, 14, 21 or 28 d, and WBSF was determined as an indicator of tenderness. Tenderness was reduced ($P < 0.05$) with ZH regardless of AA supplementation. Lysine, Met, Lys+Met, and Cont+ had less tender steaks ($P < 0.05$) throughout all aging groups as compared with Cont−. Steaks from Lys treated cattle were less tender ($P < 0.05$) than Cont+ during the 7 and 14 d aging periods. After 21 d of aging all steaks from AA's fed animal had similar WBS ($P > 0.05$) as Cont+. Control− also had the highest percentage of tender steaks after 21 d of aging ($P < 0.05$). Supplementation of encapsulated AA's in conjunction with ZH feeding resulted in decreased tenderness even after aging for 28 d when compared with steaks from Cont- cattle. Supplementation of encapsulated lysine and ZH resulted in less tender steaks up to 14 d of aging when compared with ZH alone. Further research is needed to determine if this decrease in tenderness can be detected by the consumers.

Key Words: lysine/methionine, tenderness, zilpaterol hydrochloride

91 Influence of multi exogenous enzymes on performance and carcass characteristics in growing rabbits. H. Gado*[1] and A. Z. M. Salem[2], *[1]Animal Production Department, Faculty of Agriculture, Ain Shams University, Qalubia, Egypt, [2]Facultad de Medicina Veterinaria y Zootecnia, Universidad Autonoma del Estado de Mexico, Mexico.*

This study was conducted to investigate productivity of growing rabbits fed different levels of multi exogenous enzymes of ZADO (EZ) in diets. One hundred twenty Hy-Plus 30-d-old weaned rabbits were used in the study. Animals were divided into 4 comparable experimental groups (30 growing rabbits in each group) in a completely random design. The first group was fed a commercial diet and kept without treatment as a control group. The 2nd; 3rd and 4th groups were fed the same diets but supplemented with 1(EZ1), 3 (EZ3) and 5 (EZ5) kg ZADO/ton of diet, respectively. The experimental period lasted for 30 d and was carried out during growing period (from weaning to marketing at 60 d). Daily body weight gain; feed efficiency, feed conversion and final body weight of growing rabbits increased ($P < 0.05$) with increasing the EZ levels in diets compared with control ones. Feed intake was not affected by EZ supplementation. Supplementation of rabbit diet with EZ increased ($P < 0.05$) dressing percentage, carcass weight and absolute and relative internal organs weight to carcass weight. Post-weaning mortality decreased ($P < 0.05$) compared with those unsupplemented rabbits. The improvement in rabbit performance and carcass characteristics was more in EZ3 or EZ5 than EZ1 group. It can be concluded that supplementation of ZADO to rabbit diets showed enhanced growth performance, carcass traits and decreasing mortality rate, during growing period. At the economic point 3 kg ZADO/ton diet is recommended for growing rabbits

Key Words: carcass, growth, productive

92 Influence of different forms of lipid supplements and frequencies of fed on physical characteristics of heifer meat. M. C. A. Santana*[1], R. A. Reis[2], A. V. Pires[3], T. T. Berchielli[2], V. C. Modesto[2], P. H. M. Dian[4], M. A. A. Balsalobre[5], and G. T. Pereira[2], *[1]EMATER, Goiânia, Goiás, Brazil, [2]São Paulo State University, Jaboticabal, Sao Paulo, Brazil, [3]Sao Paulo University, Piracicaba, São Paulo, Brazil, [4]Camilo Castelo Branco University, Descalvado, São Paulo, Brazil, [5]Bellman, Mirassol, São Paulo, Brazil.*

This research aimed to evaluate by physical quality of meat (color – a*, b*, L*; shear force–WBSF; water-holding capacity – WHC; pH and cooking loss percentage –CLoss) the effects of different fat sources on meat attributes of heifers finished in pasture. The experiment was designed as a completely randomized, using a 3x2 factorial arrangement of treatments, replicated 7 times, in which 17 mo-old crossbred heifers (1/4 Nellore x 1/4 Santa Gertrudis x 1/2 Braunvieh) were fed for 135 d according to the treatments: soybean grain (SG), soybean oil (SO), and rumen-protected fat, Megalac-E (MEG), and the 2 supplement feeding frequencies (Monday, Wednesday and Friday – MF; and daily –DL). At slaughter, LM muscle pH measurements were taken, and samples between 12th and 13th were harvested and frozen at −20°C for meat evaluation. Samples of LM were evaluated for color interface in the L*a*b* color space and LM steaks were thawed and roasted to evaluated WBSF. The WHC was obtained by determining the difference of the LM sample weights under 10 kg of pressure for 5 min. The CLoss value was determined according to the reduced percentage rate before and after the meat was cooked. All variables were not different ($P > 0.05$) among treatments. The results of this research suggest that the physical indicators of meat quality were not influenced by the supplements and its feeding frequencies.

Table 1. Means for shear force (WBSF), water-holding capacity (WHC), and percentage cooking loss (CLoss), the colors a, b and L, and meat pH of heifers fed with different lipid supplement (SG. SO, MEG) and supply frequencies [Monday, Wednesday and Friday (MF) or daily (DL)].

	Supplement and frequency					
Item	SG	SO	MEG	MF	DL	SD
WBSF (kgf/ cm3)	8.3	8.8	7.6	8.0	8.3	1.9ns
WHC (%)	72.0	72.3	72.9	73.2	71.8	3.1ns
CLoss (%)	33.9	33.7	32.6	33.2	33.6	2.1ns
L (%)	36.4	36.0	36.9	36.9	36.0	1.7ns
a (%)	17.9	17.6	18.3	18.2	17.7	1.0ns
b (%)	3.4	3.3	4.1	3.8	3.5	0.8ns
pH	5.7	5.7	5.8	5.7	5.7	0.1ns

Key Words: soybean, soybean oil, protect fat

93 Performance, carcass, economics of production, hematological status, and organoleptic evaluation of broilers fed with graded levels of cowpea testa-based diets. P. O. Fakolade*[1], B. O. Alabi[1], A. A. Amao[1], and A. H. Ekeocha[2], *[1]Osun State University, Osogbo, Osun, Nigeria, [2]University of Ibadan, Ibadan, Oyo, Nigeria.*

Nutritional challenge of today is to provide for the worlds' present inhabitants without degrading resources needed to meet the greater nutritional challenges of tomorrow. Now, livestock producers focus on agro- industrial by-products and wastes, which are not utilized by man in underdeveloped country; an example is cowpea testa meal (CTM). Cowpea testa meal has been reported to be a cheaper alternative (waste) to soybean meal in poultry nutrition, but contains some anti-nutritional factors, which could limit its usage. The objective of this study focus on digestibility status, carcass and organoleptical evaluation, economics of production and the hematological status, of 3 hundred and 60 broiler birds (Arbor acre) randomly allotted into 4 dietary groups with 3 replicates in a completely randomized design. Four diets were formulated with CTM replacing soybean meal at 0%, 15%, 30%, and 50% grade levels for 56 d. There were significant ($P < 0.05$) differences between diets in final weight gain, average daily feed intake, feed to gain ration. Birds on control (0%) and (15%) CTM diet had significant ($P < 0.05$) weight gained than those fed with 30% and 50% CTM inclusion level. Panelist rated T_1 and T_2 with highest values; for color, flavor, tenderness, juiciness, texture and overall acceptability, while color, tenderness and juiciness were seen to have no significance differences ($P > 0.05$) among all the treatments. For carcass evaluation, organs and primal cut, were seen to have significant differences for lungs, gizzard, proventriculus, and chicken back, while ($P > 0.05$) was not observed in others organs or cuts. Hematology studies had no significant differences ($P > 0.05$) but cost of production was lower in broiler fed 15% CTM compare with 0% and other inclusion levels. Therefore, cowpea testa can be used to substitute soybean at 15% in broilers diet at both starter and finisher phase for effective growth performance and good carcass quality at a reduced cost of production.

Key Words: cowpea testa, digestibility, organoleptic properties.

94 Effects of feeding flaxseed or sunflower-seed in high forage diets on biohydrogenation intermediates in adipose tissues of yearling steers. C. Mapiye*[1], T. D. Turner[1], D. C. Rolland[1], J. A. Basarab[2], V. S. Baron[1], T. A. McAllister[3], H. C. Block[4], and B. Uttaro[1], J.L. Aalhus[1], and M. E. R. Dugan[1], *[1]Agriculture and Agri-Food Canada, Lacombe Research Centre, Lacombe, AB, Canada, [2]Alberta Agriculture*

and Rural Development, Lacombe Research Centre, Lacombe, AB, Canada, [3]Agriculture and Agri-Food Canada, Lethbridge Research Centre, Lethbridge, AB, Canada, [4]Agriculture and Agri-Food Canada, Brandon Research Centre, Brandon, Manitoba, Canada.

Supplementing high forage diets with oilseeds can increase deposition of biohydrogenation intermediates in adipose tissues; however, the effects of forage type have not been widely studied. This study examined the effects of feeding 70:30 forage:concentrate diets to yearling steers for 205 d, with either grass hay (GH) or red clover silage (RC) as the forage source, and concentrates containing either sunflower-seed (SS) or flaxseed (FS), each providing 5.4% oil to diets. Two pens of 8 animals were fed per diet. At harvest, perirenal fat (PF) closest to the cranial-central part of the whole PF and subcutaneous fat (SF) adjacent to the 12th rib were collected, methylated with sodium methoxide, and analyzed using a combination of GC (100 m highly polar column) and Ag^{+}-HPLC. Data were analyzed using PROC MIXED procedure of SAS including oilseed, forage and their interaction as the main effects. Pen was the experimental unit. Overall, fatty acid (FA) profiles in PF and SF followed similar trends when feeding FS or SS in high forage diets but SF compared with PF had greater ($P < 0.05$) proportions of n-3 FA, conjugated linoleic acids, mainly rumenic acid (RA), atypical dienes (AD), and less ($P < 0.05$) proportions of n-6 FA and *trans*-18:1 isomers, mainly vaccenic acid (VA). Feeding diets containing SS versus FS elevated ($P < 0.05$) adipose tissues proportions of VA, RA and linoleic acid (LA). Steers fed diets containing GH versus RC or FS versus SS had greater ($P < 0.05$) adipose tissue proportions of total n-3 FA, mainly α-linolenic acid (ALA) and total AD. A forage × oilseed type interaction ($P < 0.05$) was found for total conjugated linolenic acid (CLNA), with their greatest adipose tissues proportions being produced when feeding the RC-FS diet. Overall, feeding SS containing diets was more effective in increasing adipose tissues proportions of VA, RA and LA while enrichment of ALA, CLNA and AD were achieved by feeding diets containing FS. Feeding forages also affected adipose tissue FA profiles, but their effects were generally of less magnitude compared with oilseed effects.

Key Words: adipose tissue, forage, oilseed

95 Growth, carcass traits and meat color stability in steers finished on a potato-based versus a corn-based ration. K. J. Thornton*, M. J. Colle, J. A. Macumber, M. E. Doumit, R. Richard, C. W. Hunt, and G. K. Murdoch, *University of Idaho, Moscow.*

Increasing feed prices and competition for available commodities has driven beef producers to consider alternate feedstuffs. However, it is imperative that these alternate feeds do not negatively affect growth, carcass traits, or end product quality. In the Northwestern US potato by-product is used as a corn substitute. We compared growth, carcass traits and color stability in steers fed either a conventional finishing ration containing corn and barley as the grains (CB, n = 20) or a ration with 10 percent potato by-product substituted for corn (PB), balanced for energy and nitrogen. No differences ($P > 0.05$) were observed in ADG, FCR, DMI, HCW, PYG, REA, KPH, FYG, quality grade or marbling score. Steers finished on a PB ration produced strip loin steaks with lower ($P = 0.04$) WBSF values. No significant differences were observed in the L*, a* or b* values in the longissimus dorsi (LD) measured at 0, 1, 3, 5, 7 and 9 d of simulated retail display . Gluteus medius (GM) steaks from steers finished on a PB ration had a higher a* value on d 5 ($P = 0.03$). No differences were observed in L* or b* values in the GM. American Meat Science Association (AMSA) evaluation guidelines were used to evaluate browning, discoloration, color uniformity and surface discoloration in the LD and GM muscles. The LD steaks from steers finished on a CB ration had numerically less; browning, discoloration, surface discoloration and more uniformity during simulated retail display. However, the amount of browning ($P = 0.01$) and the discoloration ($P = 0.05$) were significantly different on d 7. No visual color differences in color were observed in the GM. While steers finished on either a PB or CB finishing ration exhibited no difference in carcass quality, steers fed a PB ration had more tender strip steaks. In contrast, color stability may be increased in the LD of steers finished on a CB ration. Overall, subtle differences in meat quality exist between steers finished on either a CB or PB ration, but both rations result in high quality beef products.

Key Words: potato by-product, end-product quality, color stability

96 Influence of *Salix babylonica* extract and exogenous enzymes on meat quality in growing lambs. J. Cayetano[1], A. Z. M. Salem*[1], H. Gado[2], and R. Rojo[3], *[1]Facultad de Medicina Veterinaria, Universidad Autonoma del Estado de Mexico, Mexico, [2]Animal Production Department, Faculty of Agriculture, Ain Shams University, Qalubia, Egypt, [3]CU-UAEM Temascaltepec, Universidad Autonoma del Estado de Moxico, Mexico.*

The objective of the present study was to determine the effect of the addition of extract of *Salix babylonica* and exogenous enzymes in combination or individually on the quality of meat in lambs. Suffolk lambs of 6 to 8 mo-old were used in the study. Lambs were divided into 4 groups of 5 animals each in a completely randomized design and the treatments were (1) Control: fed a basal diet of concentrate (30%) and corn silage (70%); (2) EZ: fed the basal diet plus 10 g of enzyme; (3) SB: fed the basal diet plus 30 mL of *S. babylonica* extract, and (iv) EZSB: fed the basal diet plus 10 g enzyme and 30 mL of *S. babylonica* extract. Lambs were housed in individual cages for 60 d as experimental period. The SB was given orally while the EZ was mixed with a small amount of the concentrate, while the corn silage was offered ad libitum. At the end of experimental period, all lambs were slaughtered and samples of Longissimus dorsi muscle were taken. Samples were analyzed for crude protein, crude fat, ash and dry matter. Some parameters of meat quality were determined (color parameters, PH, carcass temperature and average daily gain). There were no significant differences between the 4 treatments ($P < 0.05$) in meat color coordinates (L*, a*, b*), temperature, average daily gain. Meat pH was lower ($P < 0.05$) in EZSB compared with other treatments. L* (lightness) was highest in EZSB ($P < 0.05$) compared with the other treatments. In conclusion, administration of EZSB in the diet improves measured meat quality parameters by reducing the pH and increase meat lightness compared with EZ and SB individually.

Key Words: exogenous enzyme, lamb, meat quality

97 Effects of alternative cattle finishing strategies on meat quality characteristics. K. J. Phelps*[1], K. A. Miller[1], C. L. Van Bibber-Krueger[1], A. K. Sexten[1], J. S. Jennings[2], J. S. Drouillard[1], and J. M. Gonzalez[1], *[1]Kansas State University, Manhattan, [2]Alltech Inc., Nicholasville, KY.*

Effects of alternative finishing strategies on fresh meat quality were examined in beef steers (64 pens; 8 steers/pen) using a randomized complete block design with a 2 × 2 factorial treatment arrangement. For factor 1, diets with inorganic trace mineral supplement, vitamins A and E, Rumensin, and Tylan (C) were compared with diets with PN Beef supplement (PN; Alltech, Inc.). The PN treatments were fed the basal diet with PN Beef Receiver from d 1–20, and PN Beef Finisher

from d 21 to harvest. Factor 2 consisted of the presence or absence of exogenous growth promotants (+GP vs. –GP). Steers in the +GP treatments were implanted initially with Component E-S, reimplanted with Component TE-S, and fed 400 mg/steer daily of ractopamine-HCl (Elanco Animal Health) for the final 28 d before harvest. The basal diet consisted of steam-flaked corn, wet corn gluten feed, wheat straw, and supplement. Steers were harvested on d 175, strip loins were removed from 2 carcasses selected at random from each pen, transported to Kansas State University, weighed, vacuum packaged, and aged for 14 d. On d 14, loins were reweighed to assess purge loss and fabricated into 2.54-cm-thick steaks for determination of Warner-Bratzler shear force and color stability during a 7-d retail display. There were no interactions ($P > 0.05$) between feeding strategy and exogenous growth promotants. Purge loss was less for PN compared with C loins ($P < 0.01$). Use of GP increased moisture loss during cooking ($P < 0.05$), while feeding PN decreased moisture loss during cooking ($P < 0.05$). Steaks from +GP were less tender ($P < 0.01$) than –GP steaks, but C and PN were not different ($P > 0.05$). Initial values for L* were less for C than for PN ($P < 0.05$), but changes in color, surface percentages of oxymyoglobin and metmyoglobin, and metmyoglobin reducing ability were unaffected by feeding strategy ($P > 0.05$). In conclusion, alternative feeding strategies can favorably affect meat tenderness and water-holding capacity without compromising retail display characteristics.

Key Words: implant, beta agonist, feed additive

98 Gene expression of lipogenic enzymes present in muscle of young bulls fed ground soybean or rumen-protected lipid with or without ionophore. M. M. Ladeira[1,2], D. M. Oliveira[1], A. Chalfun Junior[1], M. L. Chizzotti[1], H. G. Barreto[1], T. C. Coelho[1], P. D. Teixeira[1], C. C. Coelho[1], and D. R. Casagrande*[1], *[1]Federal University of Lavras, Lavras, MG, Brazil, [2]Purdue University, West Lafayette, IN.*

The objective of this study was to evaluate the gene expression of lipogenic enzymes in the muscle of young bulls fed soybean grain (SB) or rumen protected lipid (RPL), with or without the supplementation of monensin (M). Forty bulls were allotted in a completely randomized design using a 2 × 2 factorial arrangement. The diets had 6.6% EE and the corn silage was used as forage. Half of the bulls fed SB or RPL was supplemented with 230 mg/hd/d of monensin. The bulls were harvested with on average 497 kg. The genes evaluated were acetyl coA carboxylase (ACC), adipocyte-type fatty acid binding protein ($FABP_4$), stearoyl coA desaturase (SCD), lipoprotein lipase (LPL), glutathione peroxidase (GPX), peroxisome proliferator activator receptor (PPAR-α), and sterol regulatory element binding protein (SREBP-1c). The gene expression was analyzed using the qPCR technique and the evaluation of relative quantification was carried out by formula $2^{-\Delta\Delta C_T}$. The data were analyzed using PROC GLM of SAS 9.1. There was no difference ($P > 0.05$) in gene expression for ACC and SREBP-1c between diets. However, the LPL was 4 times more expressed ($P < 0.05$) in the muscle of bulls fed SB than RPL. The gene expression of $FABP_4$ also presented similar performance when SB was used, being around twice more expressed ($P < 0.05$). The largest difference in gene expression was observed for SCD. Muscle of bulls fed SBM, RPL, and SB, presented, respectively, 12, 6 and twice more SCD gene expression ($P < 0.05$) compared with the RPLM diet. The GPX was 2.5 times more expressed ($P < 0.05$) in the muscle of bulls fed SBM than the other 3 diets. Similar result occurred in the gene expression of PPAR-α. The gene expression of the enzymes FABP and LPL were influenced ($P < 0.05$) by the monensin only when RPL diet was used. For the first enzyme ionophores reduced the gene expression, and for the second, it increases the gene expression. The use of soybean grain or rumen protected lipid, with or without monensin, changed the gene expression of the lipogenic enzymes, and the main affected enzymes were LPL and SCD.

Key Words: nutrigenomics, monensin, soybean