Meat Science and Muscle Biology II

TH290 Shelf life of fresh pork sausage from immunologically castrated barrows. K. A. Jones-Hamlow*[1], A. L. Schroeder[2], and A. C. Dilger[1], [1]*University of Illinois, Urbana-Champaign,* [2]*Zoetis, Kalamazoo, MI.*

Immunological castration is an emerging technology in the pork industry and determination of quality characteristics of fresh sausage from immunologically castrated pigs is needed. Fat and lean trim was obtained from entire carcasses and pooled by castrate type from immunological castrates (IC) and physical castrates (PC) (n = 10). Sub-samples of trim were collected for proximate analysis. Based on results, trim was mixed into five 15 lbs batches of both IC and PC, targeting 25% fat. Batches were ground, mixed with spices, stuffed into casings and sliced into 1.25 cm patties. Samples were collected from each batch for proximate composition. Patties were placed on trays, overwrapped, and assigned to frozen storage times of: 0, 4, 12 wk. Upon conclusion of frozen storage, packages were placed under constant light (883 lx) at 4°C for 5 d to simulate retail display. Patties were evaluated for color and percent discoloration on d 1, 3 and 5 by a trained 5-person panel. On d 5 of each storage time point, patties were evaluated for sensory characteristics and thiobarbituric acid reactive substances (TBARS). Patties were also evaluated for cooking loss, textural properties (compression and break strength) and cooked proximate composition. Data were analyzed as a one way ANOVA; visual evaluations, sensory characteristics and TBARS were analyzed with repeated measures. Patties from IC were darker (3.30 vs. 2.90, $P < 0.05$, respectively) than PC. Overall, discoloration increased ($P < 0.05$) over time, but there were no differences within each storage week. Sensory characteristics were also similar ($P > 0.05$) between IC and PC. Averaged across all storage times, TBARS from IC were reduced (0.47 vs. 0.22 mg/kg, $P < 0.05$, respectively) compared with PC; however, there were no differences within each storage week. Textural properties ($P > 0.05$), cooking loss ($P = 0.94$) and raw ($P = 0.12$) and cooked ($P = 0.65$) proximate composition were similar between IC and PC. Overall, immunological castration had no detrimental effects on the shelf life, sensory characteristics, or textural properties of fresh pork sausage.

Key Words: immunological castration, sensory, textural property

TH291 Gene expression of lipogenic enzymes present in muscle of young bulls fed ground soybean grain or cottonseed and vitamin E. 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], and E. E. L. Valente[1], [1]*Federal University of Lavras, Lavras, MG, Brazil,* [2]*Purdue University, West Lafayette, IN.*

The objective was to evaluate the gene expression of lipogenic enzymes present in the muscle of young feedlot bulls fed ground soybean grain (SB) or ground cottonseed (CS), with or without the inclusion of the vitamin E (E). Forty bulls, with an initial body weight of 339 ± 15 kg, and an initial average age of 20 ± 1.3 mo were allotted in a completely randomized design using a 2 × 2 factorial arrangement. The diets contained 20.0% of SB or 24% of CS, 6.5% ether extract and corn silage was utilized as forage. Vitamin E was supplemented at a rate of 2,500 IU/hd/d. Bulls were harvested at an average BW of 456 ± 15.1 kg. At 24 h post-mortem, samples of the longissimus dorsi muscle were collected at the 13th rib and stored at −80°C. The genes evaluated were acetyl coA carboxylase (ACC), adipocyte-type fatty acid binding protein (FABP4), 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 qPCR technique and the evaluation of relative quantification was carried by formula $2^{-\Delta\Delta C_T}$. Data were analyzed using PROC GLM of SAS 9.1. The gene expression of ACC and GPX was greater for the diets SB and SBE. Muscle of the bulls fed SB diet had the greatest gene expression for FABP4. Regarding the SCD, the greatest gene expression occurred when bulls fed CS diet. Otherwise, the LPL was more expressed when the SBE was used. In conclusion, the gene expression of lipogenic enzymes was affected by the oilseed and vitamin E supplementation.

Table 1. Effect of soybean grain (SB) and cottonseed (CS), with or without the inclusion of the vitamin E (E) on gene expression (fold change)

Enzyme	SB	SBE	CS	CSE	SEM	P-value
ACC	1.53[a]	1.66[a]	1.00[b]	1.35[ab]	0.13	<0.01
FABP4	2.26[a]	1.28[b]	1.00[b]	1.30[b]	0.14	<0.01
SCD	1.00[b]	1.11[b]	1.93[a]	1.02[b]	0.11	<0.01
LPL	1.86[b]	3.05[a]	1.00[c]	2.10[b]	0.14	<0.01
GPX	1.34[a]	1.46[a]	1.00[b]	1.26[ab]	0.08	<0.01
PPAR-α	2.21[a]	1.95[ab]	1.00[c]	1.40[bc]	0.17	<0.01
SREBP-1c	1.00[c]	1.43[ab]	1.69[a]	1.28[bc]	0.09	<0.01

[abc]Different letters in the same row differ ($P < 0.05$) for the Tukey test.

Key Words: nutrigenomics, mRNA, oilseed

TH292 Effects of frame, forage type and time-on-pasture on carcass traits, LM composition, and meat color in steers. G. Volpi Lagreca*[1], R. Arnoni[1], M. Alende[1], S. K. Duckett[1], R. M. Lewis[2], and J. P. Fontenot[2], [1]*Clemson University, Clemson, SC,* [2]*Virginia Tech University, Blacksburg.*

Angus-cross steers (n = 144; 365 ± 50.9 kg BW; 13.3 mo) were used in a 3-year study (2010–2012) to assess the effects of frame, forage type and time-on-pasture on carcass characteristics, LM proximate composition, and color (L*, a* and b*) at 12th rib. Steers were randomly assigned to 1 of 6 treatments, defined by a 2 × 2 × 2 factorial experiment: frame (medium or large), forage type (PAST -bluegrass (*Poa pratensis*), orchardgrass (*Dactylis glomerata*), tall fescue (*Lolium arundinaceum*) and white clover (*Trifolium repens*) - or ANNUAL -high sugar sorghum-sudangrass (*Sorghum bicolor*)-) and time-on-pasture (155 or 209 d). All interactions were non-significant ($P > 0.05$) except LM L*, subcutaneous (s.c.) b* and LM iron. Increasing time-on-pasture increased ($P < 0.05$) hot carcass weight (268.1 vs. 236.5 kg), s.c. fat thickness (0.47 vs. 0.32 cm), kidney, pelvic and heart fat (1.17 vs. 0.83%), skeletal maturity (171.3 vs. 160.4), and yield grade (2.09 vs. 1.70). Both time-on-pasture and forage type affected LM and s.c. color scores. Longer time-on-pasture increased LM a* (26.8 vs. 26.4) and b* (11.7 vs. 11.2) and s.c. a* (8.7 vs. 7.1) and b* (18.6 vs. 16.8), whereas LM a* and b* were greater ($P < 0.05$) in PAST compared with ANNUAL (26.9 vs. 26.4 and 11.6 vs. 11.3). There was a significant interaction between frame and forage type for LM L*, which was greater ($P = 0.001$, 42.1 vs. 40.5) for large compared with medium with ANNUAL, and for s.c. b*, which was greater ($P < 0.0001$, 18.7 vs. 16.7) for medium compared with large with ANNUAL, but no differences where observed with PAST. Greater time-on-pasture increased ($P < 0.05$) ash (1.39 vs. 1.28 g/100 g LM), zinc (3.27 vs. 3.11 mg/100 g LM) and aluminum (0.24 vs. 0.20 mg/100 g LM), whereas time-on-pasture increased iron ($P = 0.0005$,

1.82 vs. 1.60 mg/100 g LM) with ANNUAL, without differences with PAST. Time-on-pasture affected carcass, LM proximate composition, and tissue color; whereas forage type and frame score had minor effects.

Key Words: beef, forage, grazing

TH293   Fatty acid profile of meat from Nellore young bulls fed crude glycerin and lipid sources. R. A. Silva, J. F. Lage*, E. San Vito, A. F. Ribeiro, L. M. Delevatti, E. E. Dallantonia, M. Machado, L. R. Simonetti, B. R. Vieira, and T. T. Berchielli, *Universidade Estadual Paulista, Jaboticabal, Sao Paulo, Brazil.*

This objective of this study was to evaluate the effects of feeding different lipid sources on diets containing crude glycerin (CG) - 80% glycerol - included on 10% of DM diet on longissimus muscle fatty acid profile of Nellore young bulls finished in feedlot. Forty young bulls (Nellore), with 426.00 ± 30.20 initial BW, were randomly assigned to 4 treatments, with 10 replicates. The diets (30% of corn silage and 70% concentrate) were: 10% of CG being control diet (Cn); 10% of CG plus soybean oil (SO), 10% of CG plus whole soybean grain (SG) or 10% of CG plus bypass fat (BF). The Cn diet had 3.5% of ether extract (EE) and diets with lipid sources had 5.5% of EE. Concentrates were composed of grounded corn, soybean meal, urea/ammonium sulfate, mineral mixture and lipid sources. The diets were isonitrogenous. Animals were assigned to individuals pens, fed 97 d and slaughtered with average of 521.30 ± 44.27 kg BW. All carcasses were chilled at 0°C for approximately 24 h. A boneless longissimus muscle (LM) section 10 cm thick was removed from the posterior end of the wholesale rib. LM samples were individually vacuum-packaged and held at -20°C for analysis. The samples were submitted to lipid extraction and methylation and analyzed by gas chromatography. The experiment was conducted according to a completely randomized design and data were analyzed by the GLM procedure of SAS, and the Tukey test used considering 5% probability. The treatments did not affected the contents of CLA ($P = 0.11$), total saturated fatty acid ($P = 0.67$), total unsaturated fatty acid ($P = 0.67$), total monounsaturated fatty acid ($P = 0.19$), total polyunsaturated fatty acid ($P = 0.40$) and relation n-6:n-3 ($P = 0.45$). The inclusion of lipid sources on diets containing crude glycerin (10% DM) did not alter the fatty acid profile of meat from Nellore young bulls finished in feedlot.

Key Words: beef cattle, glycerol, feedlot

TH294   Visible and near infrared reflectance spectroscopy (Vis-NIRS) to predict tenderness in Nellore cattle. M. N. Bonin*[1], S. L. Silva[1], L. Bunger[2], D. Ross[2], C. Craigie[2], R. C. Gomes[3], A. Figueiredo[1], P. Torralvo[1], J. H. A. Campos[1], V. N. Barbosa[1], F. J. Novais[1], M. H. A. Santana[1], L. S. Oliveira[1], M. Mazon[1], J. B. S. Ferraz[1], *[1]College of Animal Science and Food Engineering, University of Sao Paulo, Pirassununga, SP, Brazil, [2]Scotland's Rural College, Edinburgh, United Kingdom, [3]Embrapa Beef Cattle, Campo Grande, MS, Brazil.*

Visible and near infrared reflectance spectroscopy (Vis-NIR) has the potential of predicting meat quality traits by acquiring scans at early postmortem and in intact samples. This technique has the advantage of being a nondestructive and quickly method that could be used as alternative of destructive, laborious and high cost methods as that used for physical and sensorial evaluation of tenderness. The aim of this study was to evaluate the accuracy of Vis-NIRS for predicting beef tenderness in Nellore cattle. Six hundred and 64 Nellore bulls with 18 to 30 mo of age were used in this study. The animals were slaughtered in 6 batches from September 2009 to November 2010. All carcasses were ribbed at the 5th rib, 48 h postmortem and a sample of the longissimus thoracis

(2.5 cm thick) was removed. A Vis-NIR spectra with a wavelength range from 400 to 1400 nm and intervals of 5 nm was collected immediately and the samples subjected to Warner-Bratzler Shear Force (WBSF) analysis. Calibration and validation procedures were performed using Partial Least Squares Regression in the program UNSCRAMBLER (version 10.1, Camo, Trondheim, Norway). For testing the Vis-NIRS accuracy at distributing the samples into classes of tenderness, predicted WBSF values were regressed against actual WBSF values. The WBSF values ranged from 2.82 to 13.14 kg, with mean = 6.95 kg and SD = 2.01 kg. Low coefficients of determination were observed in the calibration ($R_c^2 = 0.29$, RMSEC = 1.70) and in the cross-validation ($R_{cv}^2 = 0.14$, RMSECV = 1.29), indicating a low ability of Vis-NIRS for predicting exact values of WBSF in Nellore cattle. However, when used to classify meat as tender (WBSF <4.5 kg) or tough (WBSF >4.5 kg), Vis-NIRS correctly classified 91.8% of samples. These results are in accordance with other studies that reported the Vis-NIRS as a powerful tool for categorization of meat products, with correct classification of more than 80% of samples. Using Vis-NIRS spectroscopy at deboning may be a powerful technique to distinguish tender from tough meat in industrial routines to add value to meat cuts.

Key Words: *Bos indicus*, intact sample, WBSF

TH295   Influence of season of lamb finshing on meat quality. R. C. Vilarinho[1], U. Souza[1], C. P. McManus[2], and L. Kindlein*[1], *[1]Federal University of Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, Brazil, [2]Brasilia University, Brasilia, DF, Brazil.*

The present study aimed to evaluate carcass and meat characteristics of lamb (<18 mo of age) slaughtered in different seasons of the year (spring and summer) reared in semi-intensive systems in Rio Grande do Sul State, Brazil. Several genetic and environmental factors can affect quantitative and qualitative traits of lamb meat. For this experiment, a total of 120 Corriedale were used, 60 finished and slaughtered in spring and 60 in the summer. After slaughter and evisceration, hot carcasses were weighed (HCW) and pH (pH_{0h}) measured. After chilling cold carcass weight was taken (CCW) and final pH (pH_{24h}). A section between the 11th and 13th ribs as taken of the longíssimus dorsi muscle for analysis. Animals slaughtered in the spring had higher weights (HCW, CCW) and rib-eye area (REA) ($P < 0.001$, $P < 0.001$, $P < 0.002$; 18.81 kg, 18.40 kg and 13.72 cm^2, respectively) than those slaughtered in the summer (18.00 kg, 17.92 kg and 12.14 cm^2, respectively). These results were expected as in this region there is greater pasture availability and quality in the spring. Other authors found darker meat in lambs slaughtered in the winter, with less fat deposits than those slaughtered in other seasons. In the present study no differences ($P > 0.05$) were found between seasons for meat quality traits including pH_0 6.50($\pm$0.02) vs. 6.40($\pm$0.01); pH_{24} 5.67($\pm$0.03) vs. 5.70($\pm$0.03); L* 34.17($\pm$2.34) vs. 33.84($\pm$3.72); a* 5.09($\pm$1.45) vs. 4.60($\pm$1.21); b* 6.73($\pm$2.56) vs. 6.82($\pm$2.43); marbling (IMF) 1.68($\pm$0.50) vs. 1.63($\pm$0.60); subcutaneous fat thickness (SF), 0.49 ($\pm$0.10) vs. 0.48($\pm$0.12); for spring and summer respectively·. The slaughter season for lambs influences carcass traits with animals slaughtered in the spring showing higher values for HCW (Kg), CCW (Kg) and REA (cm^2) than those slaughtered in the summer but this does not affect meat quality.

Key Words: carcass, lamb meat, marbling

TH296   An Investigation of the black bone syndrome with broiler chickens fed diets supplemented with 25-OH-vitamin D$_3$. L. Kindlein* and S. L. Vieira, *Federal University of Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, Brazil.*

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A study was conducted to evaluate the leg bones of chickens presenting color alteration compatible with those reported as in Black bone syndrome (BBS) using Cobb 500 male broilers fed corn-soy diets. BBS in chickens refers to darkened meat along the leg bones. It is associated with an increased bone porosity, which then allows the marrow to leak into the meat. This defect has been observed with broilers presenting adequate levels of Ca, P as well as vitamin D_3 and therefore, it is suspected that the greater porosity arises from marginal deficiencies paralleling the high demand of these nutrients in the modern fast growing broiler. For this experiment, birds were placed in floor pens, 22 per pen and were fed diets using industry requirements in a feeding program from 1 to 7 d (1% Ca, 0.5% Av P, 3200 ICU D_3), 8 to 21 d (0.95% Ca, 0.48% Av P, 3200 ICU D_3), 22 to 35 d (0.9% Ca, 0.45% Av P, 2775 ICU D_3), and 36 to 39 d (0.85% Ca, 0.43% Av P, 1825 ICU D_3). A factorial of diet type and 25-OH-vitamin D_3 supplementation (69 ppb) was used. A diet with a moderate increase in anti-trypsin factors by adding 6% of raw soybeans (Malabsorption) and a diet using 6% toasted soybeans (Regular) were used. Broilers were processed at 39 d and the right tibiae of 8 birds from each pen were collected. Bone-in tibiae were cooked to reach 72°C at the muscle-bone junction and further deboned. Bones were evaluated by their proximal epiphysis visual appearance for the level of BBS as: acceptable (absence of darkening), intermediate (moderate darkening) and unacceptable (accentuated darkening). Tibiae was also submitted to a color evaluation using the L, a*, b* scale using a portable Minolta colorimeter at the midshaft. No tibiae from the Malabsorption diet was classified as acceptable; however, birds fed Malabsorption diet supplemented with 25-OH-vitamin D3 showed similar appearance as those from the Regular diet. The a* (red) color coordinate measured at the midshaft surface of uncooked bones showed lower values ($P < 0.05$) in the birds of Regular diet indicating a higher incidence of BBS with birds fed the Malabsorption diet.

Key Words: black bone syndrome, color meat, malabsorption diet

TH297   Effects of feeding ractopamine to immunologically castrated pigs on carcass cutting yields and fresh meat quality. B. K. Lowe*[1], G. D. Gerlemann[2], S. N. Carr[3], P. J. Rincker[3], A. L. Schroeder[4], D. B. Petry[5], G. L. Allee[2], F. K. McKeith[1], and A. C. Dilger[1], [1]University of Illinois, Urbana, [2]University of Missouri, Columbia, [3]Elanco Animal Helath, Greenfield, IN, [4]Zoetis, Kalamazoo, MI, [5]Newsham Choice Genetics, West Des Moines, IA.

Thirty-two pens with 22 pigs per pen were used to evaluate effects of feeding ractopamine (RAC; 5 mg/kg) to physically castrated (PC) and immunologically castrated (IC) pigs on carcass characteristics, cutting yields, and pork quality. Male pigs were randomly assigned to sex treatments at birth and fed the same nursery diets before allotment in a grow-finish barn. Pigs in the PC group were physically castrated at 5 d of age. Pigs in the IC group were administered Improvest at 11 and 18 wk of age (d 65 of study). Diet treatments (control or RAC) were initiated on d 87 of study and final treatment arrangement was a 2 × 2 factorial of sex and diet. Pigs were marketed in 3 groups based on ending live weight (target 136 kg) and 3 pigs closest to the pen mean for each group were identified for cutting yield and quality evaluations. Data were analyzed using PROC MIXED in SAS with fixed effects of sex, diet, market group, and their interaction; carcass (n = 285) was the experimental unit. Feeding RAC increased ($P \leq 0.03$) bone-in lean and total carcass cutting yields by 0.76 and 0.70 percentage units, respectively, while having no effect ($P > 0.05$) on LM color, marbling, firmness, pH, drip loss, and tenderness. Carcasses from IC pigs had greater ($P < 0.05$) boneless lean yields (37.53% vs. 36.34%), bone-in lean yields (58.98% vs. 57.34%), and total carcass cutting yields (72.12% vs. 70.79%) than PC carcasses; however, PC loins had 0.2 units more ($P = 0.02$) marbling, were 0.2 units firmer, and were 0.16 kg more ($P < 0.01$) tender. There was an interaction ($P = 0.03$) between sex and diet for LM composition where control-fed PC loins (2.9%) had more ($P < 0.01$) lipid than all other treatment combinations (AVG = 2.3%). Group 1 carcasses (72.46%) had greater ($P \leq 0.02$) carcass cutting yields than the other market groups (AVG = 70.96%); however, group 1 loins were 0.24 kg less ($P < 0.05$) tender than loins from the other groups. The results from this study demonstrate that RAC and immunological castration are additive in terms of improving carcass cutting yields while having minimal effects on pork quality.

Key Words: Paylean, Improvest, cutting yields

TH298   Effects of temperament on meat lipid content and fatty acid composition of Nellore feeder steers. C. L. Francisco*[1,6], A. M. Jorge[1], A. Cominotte[1], I. M. Padovan[1], F. D. Rezende[2], J. M. B. Benatti[3], R. O. Roca[4], and R. F. Cooke[5], [1]Universidade Estadual Paulista - FMVZ, Botucatu, SP, Brazil, [2]APTA, Colina, SP, Brazil, [3]Universidade Estadual Paulista - FCAV, Jaboticabal, SP, Brazil, [4]Universidade Estadual Paulista - FCA, Botucatu, SP, Brazil, [5]Oregon State University - EOARC, Burns, [6]FAPESP Proc 2010/09516-1, São Paulo, SP, Brazil.

Forty-four Nellore (*Bos indicus*) steers were used to evaluate the effect of temperament on meat lipid content and fatty acid composition. Steers were evaluated for temperament at feedlot entry (d 0). Temperament was assessed by chute score and exit velocity. Steers were divided in quintiles according to their exit velocity, and assigned a score from 1 to 5 (1 = slowest steers; 5 = fastest steers). Further, individual temperament scores were calculated by averaging steer chute score and exit score. Steers were also classified according to temperament type [≤ 3 = adequate temperament (ADQ) or >3 = aggressive temperament (AGR)]. All steers were slaughtered on d 109, whereas LM samples were collected and analyzed for lipid content and fatty acid composition. Samples from ADQ steers tended to have greater ($P = 0.07$) lipid content than AGR steers (2.95 vs. 2.59 g/100g of meat, respectively). Temperament influenced ($P = 0.05$) content of t16 and c15 C18:1 isomers (0.07 vs. 0.10%, and 0.04 vs. 0.05% for AGR and ADQ steers, respectively). No differences ($P > 0.05$) were observed for CLA, however, t10,c12 CLA isomer tended to be reduced ($P = 0.07$) in AGR vs. ADQ steers (0.007 vs. 0.011%, respectively). In addition, temperament had an effect ($P = 0.03$) on c9,c12 C18:2 isomer (6.12 vs. 4.66% for AGR and ADQ steers, respectively), and tended to be higher ($P = 0.13$) to t11,c15 C18:2 isomer in AGR vs. ADQ (0.04 vs. 0.03%, respectively). Total PUFA content was greater ($P = 0.04$), as well as n-6 PUFA ($P = 0.04$) in AGR vs. ADQ steers (9.79 vs. 7.49%, and 2.12 vs. 1.60%, for AGR and ADQ steers, respectively), but, no differences ($P > 0.05$) were detected for ratio of n6:n3 fatty acids. Ratio of PUFA:SFA was higher ($P = 0.04$) in AGR vs. ADQ steers (0.23 vs. 0.17%, respectively). In conclusion, temperament is associated with fatty acid composition in the meat of Nellore feeder steers. This is a new issue and deserves further investigation.

Key Words: chute score, exit velocity, PUFA

TH299   Effects of feeding Next Enhance 300 on carcass characteristics, meat quality, and consumer sensory characteristics of longissimus beef steaks. M. C. Westerhold*[1], Z. D. Callahan[1], M. S. Kerley[1], C. L. Lorenzen[1], W. J. Sexten[1], B. R. Wiegand[1], and T. J. Wistuba[2], [1]University of Missouri, Columbia, Columbia, [2]Novus International Inc., St. Charles, MO.

Crossbred steers (n = 98; BW = 413 ± 37.7) were used in a randomized, complete block design to evaluate Next Enhance 300 (NE300, Novus Intl. Inc.) feeding on carcass characteristics, meat quality, and consumer sensory characteristics of LM steaks. Steers were blocked by initial BW and randomly assigned to treatment (TRT), with 5 replications per TRT. Corn based diet dietary TRT consisted of 0 (CON, n = 25), 150(n = 24), 300 (n = 25), and 600 (n = 24) mg·hd^{-1}·d^{-1} of NE300. Five steers/TRT (n = 20) were harvested at the University of Missouri abattoir. At 96 h post mortem (d 0) carcasses were ribbed and a 4 rib section was vacuum packaged. Aged color measurements were taken on d 14 and further quality analysis was performed on 4 steaks (1.54 cm). A quadratic increase ($P = 0.01$) in dressing percent (DP) and a quadratic decrease ($P = 0.05$) in 12th rib backfat (BF) occurred with increasing NE300 levels, with CON steers having the lowest DP and the most BF. NE300 caused a quadratic increase in LM area (LMA) ($P = 0.10$) and LMA/45.4 kg ($P = 0.10$). There was a quadratic decrease ($P = 0.04$) in calculated USDA yield grade (YG) with increasing NE300 inclusion. Due to increased DP and LMA and decreased BF and YG of 150 and 300, a quadratic increase in carcass price/45.4 kg ($P = 0.15$) was observed. However, HCW and marbling score did not differ ($P > 0.05$), thus overall carcass value did not differ. NE300 inclusion did not affect a* or b* color values at d 0 or 14. D 0 L* values were linearly decreased ($P = 0.05$) by NE300, but d 14 L* values were not affected. There was a linear decrease ($P = 0.07$) in cook loss due to NE300. A consumer sensory panel (n = 55) was performed on one steak per steer, with 4–5 panelists evaluating each sample. There was no difference ($P > 0.05$) among TRT for Warner-Bratzler shear force, drip loss, percent moisture, percent fat, or consumer opinion of overall like, liking of tenderness, juiciness, and flavor and level of tenderness, juiciness, and flavor. Feeding NE300 improved DP, BF, LMA, and YG, and had no effect on organoleptic properties of LM steaks from beef steers.

Key Words: essential oil, meat quality

TH300   Incidence of white striping in relation to the weight of broiler breast fillets. T. Z. Ferreira, S. L. Vieira, and L. Kindlein*, *Federal University of Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, Brazil.*

The objective of the study was to evaluate the incidence of normal (NORM), moderate (MOD) and severe (SEV) degrees of white striping on broiler breast fillets with different weights. With the increase in growth rate and muscle size, there has been as increase in incidence of pectoral myopathies. One of the recent meat quality problems that have been identified is the appearance of white striping or striations in poultry breast fillets following the direction of the muscle fiber. The condition is mainly associated with heavier birds, and high incidences (>50%) can occur, especially in big birds. For this experiment, 12-thousand Cobb 500 male broilers (42 d-old) of a commercial broiler strain were slaughtered and 144 (12%) broilers breast fillets were collected. The samples were separated according to weight (>310 or < 310 g). The macroscopic classification of the carcasses was performed according to the degree of severity of the stripes apparent on the pectoral muscle considering 3 groups: NORM, MOD and SEV. The data were analyzed using ANOVA. Individual birds were considered as the experimental unit for the entire analysis. Eighty-four percent (121) broilers breast fillets being classified as of moderate degree of white striping, 8.33% (12) SEV, exhibited white lines, parallel to the muscle fibers very visible on the fillet surface, and only 7.64% (11) considered as NORM, did not show any distinct white lines. Seventy-nine broilers breast fillets presented weight > 310 g, being 12.65% (10) considered as SEV, 82.27% (66) as MOD and only 5.08% (3) as NORM, totaling 94.92%

of the samples with the presence of white striping. On the other hand, of the 65 samples with weight less than 310 g, 87.7% showed presence of this myopathy, being only 3.08% (2) classified as SEV, 84.62% (55) as MOD and 12.31% (8) as NORM. This study results confirm that there is a relationship between the weight of the fillet with the incidence and degree of white striping, that suggests that the increase in growth rate of poultry, accompanied with the selection for greater growth rates of broilers, could produce a greater incidence of this condition.

Key Words: meat quality, myopathy, white striping

TH301   Evaluation of metabolic, endocrine and meat quality traits in longissimus muscle of beef cattle. M. D. Poleti, A. F. Rosa, C. T. Moncau, S. L. Silva, J. P. Eler, and J. C. C. Balieiro*, *University of Sao Paulo, Pirassununga, Sao Paulo, Brazil.*

The purpose of this work was to evaluate the metabolic, endocrine and meat quality traits in samples of longissimus dorsi (LD) muscle. We used 241 Nelore cattle raised in pasture and finished in feedlot. The animals were slaughtered at approximately 24 mo and with average weight of 508 kg. LD muscle samples were harvested from the carcass and frozen in liquid nitrogen for determination of glycogen and lactate concentrations. Steaks of 2.5 cm LD muscle (between 12° and 13° ribs) were removed at 24 h post mortem, vacuum packaged and kept at 2°C for until 14 d for subsequent Warner-Bratzler Shear Force (WBSF) evaluation. At 1, 7 and 14 d, were removed from refrigeration, allowed to bloom (20 min) and measured for L*, a* and b* objectively by using a portable spectrophotometer. Blood samples to obtain plasma were collected beginning of feedlot (ante-mortem) and at slaughter (post mortem) to determine cortisol and adrenocorticotropic hormone (ACTH) concentrations. The pH after 24 h (pH24hs) greater or equal to 5.8 were considered as potential DFD meat and pH lower than 5.8 were considered regular meat. We observed that 18.7% (n = 45) of the samples had pH24hs greater or equal 5.8. The glycogen and lactate concentrations in muscle ranged from 1.71 to 72.51 μmol/g and 1.54 to 49.53 μmol/g, respectively. However, in samples with pH24hs ≥ 5.8, only 37.8% (n = 17, for glycogen) and 8.9% (n = 3, for lactate) samples showed glycogen and lactate concentrations below 6.13 μmol/g and 6.0 μmol /g, respectively. The pH24hs had significant ($P > 0.05$) effect for color measurements (L*, a*, b*) at all times of aging, as well as, for cooking loss at 1st and 14th days of aging. The pH24hs had not significant effect ($P > 0.05$) for cortisol and ACTH concentrations (ante-mortem and post mortem). In the same way, the shear force values at different days of aging were not influenced by pH24hs. These results suggest that the concentration of glycogen in muscle is one of the factors that determine the appropriate reduction pH 24 h, but not the only one.

Key Words: DFD meat, animal stress, HPA axis reactivity

TH302   Visible and near infrared spectroscopy to predict beef quality traits in *Bos indicus* cattle. S. L. Silva*[1], M. N. Bonin[1], R. C. Gomes[2], M. R. Mazon[1], T. M. C. Leme[1], J. M. Balage[1], L. S. Martello[1], J. B. S. Ferraz[1], and P. R. Leme[1], *[1]University of Sao Paulo, Pirassununga, SP, Brazil, [2]Embrapa Beef Cattle, Campo Grande, MS, Brazil.*

This study was carried out to evaluate the ability of visible and near infrared spectroscopy (VISNIRS) to evaluate beef quality traits of Longissimus muscle (LM) in Nellore (Bos indicus) cattle. Twenty 4 h after slaughter carcasses from 206 Nellore bullocks (n = 103) and steers (n = 103) were quartered between 12th and 13th ribs and the VISNIR spectra (400 to 1,500nm), color measurements (L*,a*, b*)

and pH (pH24) of LM were collected. Following LM samples were collected for Warner-Bratzler shear force (WBSF) and cooking loss (CL) determinations. Samples were grouped in tender (WBSF ≤ 5.5 kg), intermediate (5.57.5 kg) and tough (WBSF ≥ 7.5 kg) meat. The group of animals who had tender samples showed smaller absorbance from 400 to 1,170nm whereas in those of tough group absorbance was greater in near infrared region (1,170 to 1,500nm). Regression equations obtained from VISNIR spectral data explained high portion of variation of WBSF (R^2 = 0.84 and 0.80), CL (R^2 = 0.96 and 0.80), pH24 (R^2 = 0.78 and 0.64), L* (R^2 = 0.93 and 0.82), a* (R^2 = 0.96 and 0.92), b* (R^2 = 0.95 and 0.70) in calibration and validation data sets, respectively. When comparisons were made considering tenderness groups (predicted VS observed WBSF), samples were correctly classified 86% of time. The VISNIRS technology can be used as a nondestructive tool to estimate beef quality traits of fresh meat.

Key Words: beef cattle, meat, tenderness

TH303   Effect of aging on pH and water holding capacity of muscles from Nellore beef cattle. L. R. Simonetti, J. F. Lage, E. E. Dallantonia, E. San Vito*, E. A. Oliveira, M. Machado, L. M. Delevatti, G. M. Delamagna, and T. T. Berchielli, *São Paulo State University, Jaboticabal, São Paulo, Brazil.*

This objective of this study was to evaluate the effects of aging on pH and water holding capacity (WHC) of 5 muscles: biceps femoris (BF), gluteus medius (GM), longissimus dorsi (LD), semitendinosus (ST) and trapezius thoracis (TT) from Nellore young bulls fed in feedlot. Fourteen young bulls (Nellore), with 15 mo of age were confined to individual stalls with feeders and drinkers. The diet was consisted of 40% corn silage and 60% of concentrate (grounded corn, soybean meal, urea/ammonium sulfate, mineral mixture). After 60 d of feed, the animals were harvested and the carcasses were chilled at 0°C for 24 h. The muscles were removed, individually vacuum packaged and chilled at 0°C for 1, 7 and 14 d post mortem. The WHC was measured for the difference between the weights of the sample before and after it was subjected to a pressure of 10 kg for 5 min. The experiment was conducted according to a completely randomized design in a factorial arrangement 3 × 5 (3 aging days × 5 muscles) with 14 replicates. Data were analyzed by the GLM procedure of SAS, and the Tukey test used considering 5% probability. The interaction between aging days and muscles was significant for WHC (P = 0.01). The pH (P < 0.01) and WHC (P < 0.01) from beef evaluated in 7 d was lower (P < 0.01) than beef evaluated in 1 or 14 d. The TT muscle had higher value of pH (P = 0.01) than all muscles evaluated. The BF muscle had higher WHC (P = 0.01) than ST and TT muscles. The aging reduce the pH and the water holding capacity of beef. The biceps femoris muscle showed greater water holding capacity than those muscles semitendinosus and trapezius thoracis.

Key Words: beef cattle, commercial cut, meat quality

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