

Meat Science and Muscle Biology

T104 Effect of different moving devices at loading on incidence of downers, and carcass and meat quality in market weight pigs. J. A. Correa*¹, H. Gonyou^{2,3}, S. Torrey⁴, N. Devillers⁴, J.-P. Laforest¹, and L. Faucitano⁴, ¹Laval University, Quebec City, QC, Canada, ²Prairie Swine Centre, Saskatoon, SK, Canada, ³University of Saskatchewan, Saskatoon, SK, Canada, ⁴Agriculture & Agri-Food Canada, Sherbrooke, QC, Canada.

Despite the evidence about the negative effects on animal welfare and meat quality, the electric prod is frequently used by farm handlers and truckers to load pigs onto the truck. The objective of this study was to evaluate the effects of alternative moving devices, such as the paddle and compressed air prod, at loading on the incidence of downers and bruised carcasses and on meat quality (ultimate pH and blood splashes) in pigs. In a three week trial, a total of 284 animals (120±7 kg live weight) were randomly sorted out from the finishing pen in groups of 5 pigs and assigned to one of three moving procedures: 1) moving with an electric prod and board from the finishing pen to the truck (E); 2) moving with a board and a paddle from the finishing pen to the truck (P); 3) moving with a board and a paddle from the finishing pen and using a compressed air prod in the ramp before going into the truck (A). Data were analysed using an ANOVA for factorial designs, with group as the experimental unit. Treatment E resulted in 3 % downer pigs on arrival at the abattoir compared to none in treatments P and A. The proportion of bruised carcasses was lower in P and A pigs than E pigs (32 % vs 57 %). In this study ultimate pH values in the semimembranosus (SM) and adductor (AD) muscles were generally high, but were slightly higher ($P < 0.05$) in the SM and AD muscles from E pigs compared to those from P and A pigs. A higher proportion of blood splashes was found in the SM muscle of E pigs (31 %) compared to that of A pigs (19.4 %), with P pigs being intermediate (28.2 %). These results suggest that the use of a board in combination with a compressed air prod or paddle to handle pigs at loading can be recommended to replace the use of electric prod as it reduces animal losses during transport and decreases the incidence of bruised carcasses and blood-splashes.

Key Words: Pig, Handling, Meat Quality

T105 Identification of boar-tainted carcasses with an electronic nose. S. Ampuero¹, M. Amrhein², S. Dubois¹, and G. Bee*¹, ¹Agroscope Liebefeld-Posieux, Research Station ALP, Posieux, Switzerland, ²Online Control LTD, Lausanne, Switzerland.

Production of intact males on a large scale is greatly hindered by the lack of objective, reliable and fast methods to detect boar tainted carcasses. In a preliminary study we showed that a mass spectrometry (MS) based electronic nose was potentially suited to detect boar tainted samples. The aim of the present study was to develop a system consisting of a MS electronic nose (Smart Nose 151, LDZ, Switzerland) coupled with an automatic-sampler pyrolyser (CDS pyroprobe AS2500 APLUS). The chemometric classification models are established against reference classifications based on HPLC determination of the principal boar taint compounds in the adipose tissue: androstenone (A), skatole (S), and indole (I). The analysis is performed by introducing 0.5 µL of liquefied fat in a capillary tube. The gas phase produced by pyrolysis at 600°C is instantaneously transferred to the ionization chamber of the MS. The

generated data is recorded during 240 s by scanning between 10 to 250 amu at 50 ms/amu. Over a period of 12 months, a total of 353 adipose tissue samples originating mainly from Swiss Large White and Landrace boars and barrows were analyzed. Large variations in the age and BW at slaughter, the rearing conditions and the feeding regimes were present in the set of porcine adipose tissue samples. Between 60 to 80% of the samples were used to develop different classification models by multi-class SVM (Support Vector Machine) and variable selection via genetic algorithms. Based on sensory evaluations the reference classes were defined as (expressed per kg adipose tissue): **strong boar taint:** A > 1.0 mg or S and/or I > 0.16 mg, **no boar taint:** A ≤ 0.5 mg and S and I ≤ 0.16 mg, and **mild boar taint:** A > 0.5 or ≤ 1.0 mg and S and/or I ≤ 0.16 mg. Semi-external validations, with 17 to 42% of new samples not included in the models, reveal 98% of correct identification rates of strong boar tainted samples. The results of this study confirm that a fast, reliable and objective detection of boar tainted carcasses is possible.

Key Words: Boar Taint Detection, Electronic Nose, Pyrolysis

T106 Age at the beginning of the free-range fattening period affects subcutaneous fat quality of Iberian pigs. M. A. Latorre*, B. Prieto, D. G. Valencia, and M. P. Serrano, *Centro de Investigación y Tecnología Agroalimentaria de Aragón, Zaragoza, Spain.*

The traditional productive cycle for Iberian pigs includes a final free-range fattening phase (from November to February) in which animal intake natural feed resources, mainly acorns and grass. This period has important consequences on the fat quality, which is determinant for elaboration of dry-cured products. The high level of monounsaturated fatty acids (FA) is one the most relevant quality aspects in fat from Iberian pigs. Currently, the reproductive planning of this system is based on two births per year (spring and autumn), beginning the free-range period with different age (18 or 12 months) but similar weight (110 kg BW), and being slaughtered with 160 kg BW (21 or 15 months old). In this context, a total of 40 Iberian pigs were used to study the effect of age at the beginning of the free-range fattening period on FA profile of subcutaneous fat; 18 months old (OP) and 12 months old (YP). YP were fed higher quantity of concentrates than P22 (4.5 vs. 2.5 kg/day) during the growing phase to achieve the fattening period at similar weight. Each treatment was replicated 20 times (one pig per replicate). OP had higher proportion of C14:0 ($P < 0.10$) and C15:0 ($P < 0.05$) than YP. However, YP showed higher percentage of C18:0 than OP ($P < 0.05$). In consequence, no effect of age on saturated FA was detected (28.77 vs. 29.14% for OP and YP, respectively; $P > 0.05$). On the other hand, OP had higher proportion of C18:1 ($P < 0.01$) and C20:1 ($P < 0.001$), and therefore higher percentage of monounsaturated FA (60.87 vs. 59.61%; $P < 0.01$) than YP. Fat from OP showed higher proportion of C18:4 ($P < 0.10$) but lower C18:2 ($P < 0.001$) than fat from YP. So OP had lower percentage of polyunsaturated FA than YP (10.36 vs. 11.25%; $P < 0.01$). It is concluded that Iberian pigs starting the free-range fattening period with 12 months of age have adequate fat quality but their results are worse than those showed by pigs starting fattening phase with 18 months of age.

Key Words: Age at the Fattening Period, Fat Quality, Iberian Pigs

T107 Effect of castration of females on meat quality and fatty acid profile of backfat in Iberian pigs reared under intensive production systems. M. P. Serrano¹, D. G. Valencia¹, R. Lázaro¹, A. Fuentetaja², and G. G. Mateos*¹, ¹Universidad Politécnica de Madrid, Spain, ²Copese, Segovia, Spain.

Iberian (IB) pigs are the ancestral dark-haired pigs of Spain. Currently, 80% of IB pigs are reared under intensive production systems and slaughtered at 140–150 kg body weight (BW). Both sexes are castrated. However, the production of heavy white pigs destined to dry-cured products is based on intact females (IF). Therefore, IF might be also an alternative to castrated females (CF) for IB pig production. A total of sixty crossbred (IB dam × Duroc sire) females, 80 d of age (17.6 ± 0.13 kg BW) was used to investigate the effect of castration of females on fresh meat quality and fatty acid profile of backfat (BF) of IB pigs reared under intensive production systems and slaughtered at 144 kg BW (269 d of age). Females were ovariectomized at 93 d of age (26.0 ± 0.19 kg BW). Meat samples were taken at m. Longissimus dorsi at the level of the last rib and BF samples were taken at the tail insertion. Each treatment (coded IF, CF) was replicated five times and the experimental unit was a pen with six pigs. Castrated females had 27.2% more fat and 2.7% less moisture in the m. Longissimus dorsi than IF ($P \leq 0.05$). Muscular fat content was lower for IF than for CF (6.6 vs. 9.1%; $P \leq 0.05$) but in all cases fat content was higher than required to generate high quality dry-cured products. Meat from IF was more lightness (higher L* value; $P \leq 0.01$), redder (10.1 vs. 7.5 for a*; $P \leq 0.001$), and had more intensive colour (16.7 vs. 11.2 for c*; $P \leq 0.001$) than meat from CF. Subcutaneous fat was more saturated (39.1 vs. 38.2%; $P \leq 0.05$) in CF than in IF, mostly because of the higher palmitic acid content ($P \leq 0.05$). Also, CF had lower linolenic acid content (0.61 vs. 0.68%; $P \leq 0.05$) than IF. We conclude that based on animal welfare, cost of castration, meat quality traits, and fatty acid profile, intact females are a good alternative to castrated females to produce high quality Iberian dry-cured products.

Key Words: Iberian Pigs, Female Castration, Meat Quality and Fatty Acid Profile

T108 Effect of conjugated linoleic acid, betaine or both on fatty acid composition of growing Iberian gilts. I. Fernandez-Figares*, J. M. Rodriguez-Lopez, L. Gonzalez-Valero, R. Nieto, M. Lachica, and J. F. Aguilera, *Spanisch National Research Council, CSIC, Granada, Spain.*

We have demonstrated that growing Iberian gilts (an obese porcine genotype) fed betaine plus CLA show a trend towards decreased carcass fat content (J. Anim. Sci. 2008, 86:102-). The aim of the present study was to assess the effect of betaine, CLA or both on the fatty acid profile of the subcutaneous adipose tissue, renal fat and intramuscular fat of the semitendinosus and biceps femoris muscles. Twenty gilts (20 kg BW) were individually penned and fed at 95% *ad libitum* barley-soybean meal based diets (12% CP, 0.81% lysine and 14.8 MJ ME / kg DM) containing either no added betaine or CLA, 0.5% betaine, 1% CLA, or 0.5% betaine + 1% CLA. At 50 kg, pigs were slaughtered and samples immediately frozen at -80°C until analysis. Lipids were extracted and fatty acid methyl esters were prepared using sodium methoxide in methanol and used for fatty acid composition. Methyl esters were separated and quantified by gas-liquid chromatography using a Perkin Elmer GC fitted

with a flame ionization detector and a capillary (60m×0.25mm×0.2µm) column. Data were analyzed as a two-way ANOVA in a completely randomized design with treatment as the fixed effect. Significance was set at $P < 0.05$ and differences among means were determined using a Duncan t-test. Overall, betaine effects on fatty acid profile were only observed in the inner layer of fat, with lower percentage of palmitic acid and total saturated fatty acids and greater oleic acid and total mono-unsaturated fatty acids content compared to controls. CLA elicited an increase of both CLA isomers measured and total saturated fatty acids and a decrease of total monounsaturated fatty acids, iodine values and $\Delta 9$ -desaturase index in the fat depots studied and in intramuscular fat. Pigs fed with betaine + CLA presented similar fatty acid profile to those fed CLA diets. It is concluded that CLA altered lipid metabolism, producing lower concentration of monounsaturated fatty acids and increased concentrations of CLA isomers and total saturated fatty acids in the fat depots and intramuscular fat of Iberian pigs.

Key Words: Betaine and CLA, Fatty Acid Composition, Iberian Pig

T109 Effect of L-carnitine supplementation on the performance and pork quality traits of growing-finishing swine fed three levels of corn oil. J. K. Apple*¹, J. T. Sawyer¹, C. V. Maxwell¹, J. C. Woodworth², J. W. S. Yancey¹, and R. E. Musser³, ¹University of Arkansas Division of Agriculture, Fayetteville, ²Lonza, Inc., Allendale, NJ, ³Hubbard Feeds, Inc., Mankato, MN.

Crossbred pigs (n = 216) were used to test the interactive effects of supplemental L-carnitine and corn oil on the growth performance, carcass composition, and pork quality of growing-finishing swine. Pigs were blocked by BW (43.6 ± 1.0 kg), and pens (6 pigs/pen) were randomly assigned within blocks to dietary treatments arranged in a 2 × 3 factorial design, with 0 or 100 ppm L-carnitine and 0, 2, or 4% corn oil. At the completion of the 84-d feeding trial, pigs were slaughtered and bone-in pork loins were captured during carcass fabrication for measurement of pork quality attributes. Supplementing swine diets with L-carnitine did not ($P \geq 0.29$) affect overall ADG, ADFI, or G:F, and, even though overall ADG was similar ($P = 0.60$) across dietary corn oil levels, including 4% corn oil in swine diets reduced ($P < 0.05$) ADFI, leading to improvements ($P < 0.01$) in G:F. Neither L-carnitine supplementation ($P \geq 0.25$) nor dietary corn oil ($P \geq 0.14$) affected hot carcass weight, 10th rib fat and LM depths, or fat-free lean yield. The LM from pigs fed 2 and 4% corn oil received higher ($P < 0.01$) marbling scores and had greater ($P = 0.05$) percentages of i.m. fat than the LM from pigs fed 0% corn oil. Conversely, subjective and objective pork color, firmness, and water-holding capacity were not affected by L-carnitine supplementation ($P \geq 0.19$) or dietary corn oil ($P \geq 0.10$). Lastly, neither dietary corn oil level nor L-carnitine supplementation affected cooking losses ($P \geq 0.14$) or shear force values ($P \geq 0.10$) of LM chops. Therefore, increasing the level of corn oil in swine diets resulted in improvements in growth efficiency, and appeared to increase i.m. fat content of the LM without affecting pork color or water-retention properties; however, supplementing the diets of growing-finishing pigs with L-carnitine had little to no appreciable effects on growth performance, carcass composition, or pork quality.

Key Words: Corn Oil, L-carnitine, Swine

T110 Effect of L-carnitine supplementation on the fatty acid composition of subcutaneous fat and LM from swine fed three levels of corn oil. J. K. Apple^{*1}, J. T. Sawyer¹, C. V. Maxwell¹, J. W. S. Yancey¹, J. C. Woodworth², and R. E. Musser³, ¹University of Arkansas Division of Agriculture, Fayetteville, ²Lonza, Inc., Allendale, NJ, ³Hubbard Feeds, Inc., Mankato, MN.

Crossbred pigs (n = 216) were used to test the interactive effects of supplemental L-carnitine and corn oil on the fatty acid composition of s.c. fat and LM from growing-finishing swine. Pigs were blocked by BW (43.6 ± 1.0 kg), and pens (6 pigs/pen) were randomly assigned within blocks to dietary treatments arranged in a 2 × 3 factorial design, with 0 or 100 ppm L-carnitine and 0, 2, or 4% corn oil. Approximately 12 h after slaughter, samples of backfat were removed at the level of the last lumbar vertebra, whereas samples of LM were removed during pork loin fabrication 36 h postmortem. Supplementing diets with L-carnitine increased ($P < 0.05$) the proportion of minor SFA, *cis*-vaccenic (18:1c11), and minor MUFA, and tended to decrease ($P \leq 0.10$) weight percentages of linoleic (18:2n6) and linolenic acids (18:3n3) in s.c. fat. Conversely, the proportion of all SFA (especially palmitic [16:0] and stearic [18:0] acids), and all MUFA (specifically oleic [18:1c9] and 18:1c11) decreased linearly ($P < 0.001$), whereas the proportion of all PUFA, in particular 18:2n6, increased linearly ($P < 0.001$) in s.c. fat with increasing dietary corn oil. Moreover, the iodine value (IV) of s.c. fat was not ($P = 0.18$) affected by L-carnitine supplementation, but IV increased linearly ($P < 0.001$) from 61.1 to 76.2 as dietary corn oil increased in the diet from 0 to 4%. Even though the proportions of 18:1c9, total PUFA, and IV were similar among LM samples from pigs fed 0 or 4% corn oil, supplementing 2% corn oil diets with L-carnitine increased 18:1c9 and reduced total PUFA levels (especially 18:2n6) and IV (carnitine × corn oil; $P \leq 0.02$). Increasing the dietary inclusion level of corn oil from 0 to 4% increased the polyunsaturation of s.c. fat and the LM by 91 and 32%, respectively, whereas supplementing swine diets with L-carnitine appeared to increase the proportion of 18:1c9, at the expense of 18:2n6, in pigs fed 2% corn oil.

Key Words: Corn Oil, L-carnitine, Fatty Acid Composition

T111 Carcass and *Longissimus dorsi* characteristics of finishing pigs fed sweet potato (*Ipomoea batatas* [L] Lam.) meal. S. Pietroseoli^{*1}, O. E. Moron-Fuenmayor¹, A. Paez¹, and M. J. Villamide², ¹Facultad de Agronomía, La Universidad del Zulia, Maracaibo, Venezuela., ²ETSIA, Universidad Politécnica de Madrid, Madrid, España.

Sweet potato meal (SPM: 70% foliage: 30% tuber) was evaluated as a feed for finishing pigs to determine its effects on carcass and *Longissimus dorsi* (LM) characteristics. Thirty-six commercial hybrid Landrace × Duroc pigs (62.2 ± 1.3 kg and 134 ± 2 days initial BW and age, respectively) were randomly assigned to 12 pens (n = 2 castrated males and 1 female/pen) in a randomized complete block design with four replicates. Final BW and sex were used as covariates. The trial lasted 44 d, divided into two periods (P1 and P2) of three weeks each. Treatments under evaluation were T1: during P1 15%, and during P2 30%, of the commercial concentrate (CC) was substituted by SPM; T2 (control): 100% CC; T3: the levels of substitution of CC were 10 and 20% for P1 and P2, respectively. Pigs had *ad libitum* access to feed and water and were weighed weekly. Pigs averaged 99.6 ± 1.4 kg BW when harvested at a commercial facility. Carcass pH and temperature were recorded at 0, 6, 12 and 24 h *post mortem*. Treatments differed for white viscera ($P \leq 0.01$), loin yield ($P \leq 0.01$) and fat thickness (P

≤ 0.01). Most of the traits were not affected when the maximum level of CC substitution was 20%. These results indicate that SPM can be used as an alternative feedstuff for finishing pigs.

Table 1. Carcass and *Longissimus dorsi* characteristics of finishing pigs fed sweet potato meal

	T1	T2	T3	SE
Carcass yield %	66.5	67.9	67.0	0.51
Leg %	33.8	33.4	33.6	0.28
Shoulder %	34.9	34.4	34.5	0.27
Loin %	20.3 ^b	21.2 ^a	21.0 ^a	0.19
Belly %	17.2	17.5	17.3	0.22
Red viscera %	4.1	4.2	4.3	0.56
White viscera %	13.0 ^a	10.7 ^c	12.0 ^b	0.65
Carcass length cm	78.9	78.5	78.3	0.65
Thorax girth cm	74.9	74.7	74.3	1.39
Leg girth cm	67.7	68.3	68.5	0.06
Fat thickness mm	3.4 ^b	3.6 ^a	3.1 ^c	0.06
Loineye area cm ²	39.4	42.5	41.3	1.39
LM color	2.7	2.7	2.4	0.15
LM marbling	2.3	1.9	2.0	0.22

Key Words: Pigs, Sweet Potato, Carcass Characteristics

T112 Relationships of belly-flop measurements with smokehouse yield and fatty acid composition. J. W. S. Yancey^{*}, J. K. Apple, J. T. Sawyer, M. S. Lee, and M. D. Wharton, University of Arkansas Division of Agriculture, Fayetteville.

Boneless bellies (n = 192) were tested to determine the relationship of physical attributes, compression, smokehouse yield, and fatty acid (FA) composition of the primary and secondary lean, and seam and s.c. fat layers. Bellies were measured for thickness, length, width, processing temperature, moisture of fat and lean, and belly flop. Each belly was hung over a bar (skin-side up and skin-side down) at the midline of its widest point, and the distance between the two hanging ends was measured. Bellies were transported to a commercial bacon processor, injected, and smoked to determine smokehouse yield. Smokehouse yield was poorly correlated with belly-flop measurements ($r = 0.38$ and 0.36), but compression was not correlated with smokehouse yield. Throughout the study, values for belly-flop measured skin-side up were more highly correlated to physical attributes and FA composition than were those values for skin-side down. Furthermore, the correlation of belly-flop measurements was slightly higher with the FA composition of the lean than with those of fat. Although total SFA in the fat and lean was poorly correlated ($r = 0.18$ to 0.34), and MUFA content was low to moderately correlated ($r = 0.17$ to 0.59) with belly-flop measurements; palmitic acid (16:0) was highly correlated with belly-flop measurements ($r = 0.60$ to 0.71). PUFA, which comprised 16 to 17% of the seam and s.c. fat and 12 to 13% of the lean, had strong negative correlations with belly-flop measurements ($r = -0.60$ to -0.72), particularly 18:2_{n-6}, 18:3_{n-3}, and 20:4. Belly flop also had a strong negative relationship with PUFA:SFA ($r = -0.59$ to -0.73) and iodine value ($r = -0.60$ to -0.73). Although the relationship of belly-flop with smokehouse yield was low, belly-flop was a good indicator of FA composition, especially PUFA, and is a potential indicator of belly quality in bacon operations.

Key Words: Pork, Belly-Flop, Fatty Acid Composition

T113 Comparisons of fatty acid composition in pork belly primary and secondary lean, and seam and subcutaneous fat. J. W. S. Yancey*¹, J. K. Apple¹, J. T. Sawyer¹, M. S. Lee¹, and J. C. Woodworth², ¹University of Arkansas Division of Agriculture, Fayetteville, ²Lonza, Inc., Allendale, NJ.

Pork bellies (n = 192) were obtained from a commercial processing facility to determine differences in fatty acid (FA) composition between primary and secondary lean, and seam and s.c. fat. Total fat and lean layers did not differ ($P \geq 0.21$) in total SFA, C16:0, or C18:0 percentages, but within the fat layers, seam fat had greater ($P < 0.01$) levels of total SFA, C16:0, and C18:0 than did s.c. fat, and primary lean had greater ($P < 0.01$) levels than secondary lean. As expected, MUFA was the most abundant FA type in the bellies. Lean layers had greater ($P < 0.01$) total MUFA than did fat layers. Furthermore, s.c. fat had greater concentrations ($P < 0.01$) of MUFA than seam fat, and secondary lean had greater levels ($P < 0.01$) of total MUFA than primary lean. Fat layers of the bellies had greater levels ($P < 0.01$) of total PUFA, C18:2_{n-6}, and C18:3_{n-3} than did lean. Although seam and s.c. fat layers had similar ($P = 0.36$) concentrations of C18:3_{n-3}, the s.c. layer had greater levels ($P < 0.01$) of all other PUFA studied. Primary lean had greater concentrations ($P < 0.01$) of total PUFA, C18:2_{n-6}, C20:4, but lower concentrations ($P < 0.01$) than secondary lean of C18:3_{n-3}. Levels of CLA were not different ($P = 0.17$) between fat and lean in the bellies, but s.c. fat and secondary lean had greater concentrations ($P < 0.01$) of CLA than seam fat and primary lean, respectively. Fat layers had a greater PUFA:SFA and iodine value (IV; $P < 0.01$) than lean layers; moreover, s.c. fat layer and secondary lean had greater IV ($P < 0.01$) than seam fat and primary lean. Generally, it was found that fat layers of the bellies had more PUFA than lean layers, whereas lean layers had greater levels of MUFA. Within fat layers, s.c. fat was more unsaturated than seam fat, and within lean layers, primary lean had greater concentrations of PUFA and SFA, whereas secondary lean had greater levels of MUFA.

Key Words: Pork, Belly, Fatty Acid Composition

T114 Influence of gender and slaughter age on meat and subcutaneous fat quality of heavy pigs destined to high quality dry-cured hams. M. A. Latorre*¹, G. Ripoll¹, L. Ariño², and B. Blanco³, ¹Centro de Investigación y Tecnología Agroalimentaria de Aragón, Zaragoza, Spain, ²Integraciones Porcinas S.L., Teruel, Spain, ³Jamones y Embutidos Alto Mijares S.L., Teruel, Spain.

High quality, dry-cured hams under the protection and designation of “Teruel hams” trademark are produced from heavy pigs in a specific area of Spain. Although the star product from these animals is the ham, they also provide a lot of other high quality meat products. The pigs destined to Teruel ham are crossbred (Landrace × Large White) × Duroc barrows and gilts, slaughtered at 130 kg BW. Forty eight pigs, with an average age of 176 d were used to study the effect of gender and slaughter age on Longissimus dorsi quality and fatty acid (FA) profile of pigs destined to Teruel ham. Animals were fed a commercial wheat, barley, and soybean meal diet, containing 2,360 kcal NE/kg and 0.68% total lysine. There were three treatments; barrows slaughtered at 196 d of age (B; 130.8 kg BW), gilts slaughtered at 203 d of age (G1; 130.2 kg BW), and gilts slaughtered at 210 d of age (G2; 134.3 kg BW). Each treatment was replicated 16 times (one pig per replicate). Meat from B showed higher intramuscular fat content than meat from G1, with G2 being intermediate ($P < 0.05$). Also, loin from G1 and G2 had similar protein contents and both were higher than loin from B ($P < 0.01$). Meat

from G2 was more tender than meat from G1, with B being intermediate ($P < 0.05$). No effect of treatment was detected on MUFA proportion ($P > 0.05$) but B showed higher saturated FA percentage than G1, with G2 being intermediate ($P < 0.001$). Also, G1 and G2 had similar PUFA proportions and both were higher than B ($P < 0.01$). Thus, barrows had better meat quality but worse fat quality than gilts when slaughtered at the same BW. However, an increase by two weeks in the slaughter age of gilts, with regard to barrows, improves the quality and homogeneity of meat and fat of pigs destined to Teruel ham.

Key Words: Slaughter Age, Meat and Fat Quality, Pigs

T115 Carcass fatty acid composition of growing calves fed diets containing canola oil supplements. M. Eftekhari, K. Rezayazdi*, A. Nikkhab, and A. Nejati javaremi, University of Tehran, karaj-Tehran-Iran.

The objective of this experiment was to study the effects of increasing dietary fat through the use of canola oil on fatty acid composition of growing calves. Twenty-four male Holstein calves were divided into three groups and submitted to three diets: control diet (C); a diet containing 2% canola oil (LC) and a diet containing 4% canola oil (HC) as DM basis. Diets were offered as ad libitum and twice daily (0800 and 1500). Calves were slaughtered after 4 month of feeding. The 9th through 11th ribs were obtained from the right side of each carcass and used for carcass composition analysis. Meat sample lipids were extracted by the method of Folch et al. (1957) and esterified fatty acids methyl esters were prepared according to Metcalf et al. (1966). The fatty acid methyl esters were analysed using a Unicam 4600 chromatograph, equipped with a flame ionisation detector and capillary column. Data were analyzed using analysis of variance for a completely random design using the GLM procedure of SAS software (2001) with initial BW of the experimental animals as a covariate.

Canola oil feeding had significant effects on fatty acid composition of longissimus muscle (Table 1). Feeding LC and HC diets increased ($P < 0.05$) the percentage of C18:0 and C18:1 and decreased ($P < 0.05$) the percentage of C16:0 and C16:1. There were no differences ($P > 0.05$) in the percentage of C14:0, C17:0, C17:1, C18:2 and C18:3 across treatments. The results of this study showed that canola oil had significant effects on healthful characteristics and fatty acid composition of longissimus muscle of calves.

Table 1. Effects of canola oil on fatty acid composition of longissimus muscle

Fatty acid	Treatment		
	C	LCO	HCO
14:0	2.89±0.2	2.85±0.16	2.49±0.11
16:0	29.1±0.38 ^a	25.35±1.24 ^b	23.72±0.93 ^b
16:1n7	5.35±0.44 ^a	4.25±0.31 ^b	4.18±0.12 ^b
17:0	1.44±0.09	1.41±0.18	1.23±0.06
17:1n7	0.49±0.09	0.59±0.04	0.44±0.02
18:0	23.02±1.26 ^b	24.76±1.5 ^{ab}	27.66±0.31 ^a
18:1	31.81±1.34 ^b	35.8±0.77 ^a	36.68±0.46 ^a
18:2	5.63±0.74	4.92±0.14	4.26±0.22
18:3	0.23±0.03	0.22±0.02	0.2±0.02

a,b Means in a row that lack a common superscript differ ($P \leq 0.05$).

Key Words: Canola Oil, Fatty Acid, Calves

T116 Effect of canola oil on performance and carcass characteristics of Holstein male calves. M. Eftekhari, K. Rezayazdi*, A. Nikkhah, and A. Nejati Javaremi, *University of Tehran, Karaj-Tehran-Iran.*

The objective of this study was to evaluate diet supplementation with canola oil on performance and carcass characteristics of growing calves. Twenty-four Holstein male calves were randomly divided into three groups and submitted to three diets: control diet (C); a diet containing 2% canola oil (LC) and a diet containing 4% canola oil (HC) as dry matter basis. Diets were formulated to meet or exceed nutrient requirements using the Beef NRC model (NRC, 1996) and to be isonitrogenous and isoenergetic. Diets were offered as total mixed ration (TMR), ad libitum and twice daily (0800 and 1500). Quantity of feed offered and refused was recorded daily and Calves were weighed monthly and slaughtered after 4 month of trial. Carcasses were weighed to obtain the hot carcass weight and graded to determine 12th rib backfat thickness and longissimus muscle area. Data were analyzed using analysis of covariance for a completely random design using the GLM procedure of SAS software (2001) with initial BW of the experimental animals as a covariate and effects of treatments were declared at $P < 0.05$.

Canola oil did not alter final BW and ADG ($P > 0.05$) (Table 1). Dry matter intake decreased significantly with the addition of canola oil whereas G:F was improved ($P < 0.05$). No differences were detected ($P > 0.05$) in carcass measurements except for backfat, in which calves were fed the HCO diet had more back fat compare to those fed the C diet. Empty body weight, hot carcass weight, carcass yield and longissimus muscle area, were not affected significantly by the treatments ($P > 0.05$).

Table 1. Effect of diet on performance and carcass characteristic of calves

	Treatment		
	C	LCO	HCO
final weight (kg)	374.00±14.68	387.87±18.48	395.75±19.39
ADG (kg)	1.15±0.06	1.21±0.07	1.30±0.03
DMI (kg/d)	8.42±0.24 ^a	7.86±0.30 ^{ab}	7.68±0.19 ^b
FCR	7.63±0.70 ^a	6.59±0.40 ^b	5.93±0.20 ^b
Hot carcass weight(kg)	229.48±15.57	241.22±9.80	237.46±12.47
Carcass yield (%)	54.06±0.32	55.93±1.32	56.52±1.51
LM area ^c (cm ²)	91.19±3.86	91.18±1.33	91.91±2.29
Backfat(cm)	1.05±0.06 ^b	1.25±0.06 ^{ab}	1.42±0.04 ^a

^c LM area: Longissimus Muscle area

Key Words: Canola Oil, Performance, Carcass Characteristics

T117 Characterization of meat quality and lipid profile from steers fed crude glycerol. H. L. Evans*, B. R. Wiegand, M. S. Kerley, J. H. Porter, K. S. Roberts, and B. A. Verseemann, *University of Missouri, Columbia.*

The objective of this study was to assess the optimum and maximum levels of crude glycerol for inclusion in beef cattle feedlot diets. Crude glycerol sourced from a biodiesel production facility was included at graded levels in feedlot diets of crossbred steers (n=72). Steers (225kg) were randomly assigned in pens of six steers each to one of four experimental diets with three replications each. Diets were formulated to include 0, 5, 10, or 20% glycerol. Calves were fed once daily. Pen was

the experimental unit. Blood samples were collected to measure initial and final circulating triacylglyceride, glucose, and glycerol levels. Steers were humanely slaughtered after reaching an average live weight of 537 ± 12 kg and an average 12th rib fat depth of 1.18 ± 0.13 cm. Meat quality measures of shear force tenderness and Hunter L*, a*, and b* (over 7 d shelf storage) were made. Longissimus dorsi samples were collected and intramuscular fat was extracted and prepared for fatty acid profile determination by gas chromatography. Statistical analysis revealed no differences ($P > 0.60$) for initial and final circulating triacylglycerides, glucose, or glycerol across treatment groups. Total lipid percentage within the longissimus differed ($P = 0.04$) among treatment groups and measured 2.67, 3.68, 2.37, and 2.91% (SEM = 0.29) for 0, 5, 10, and 20% glycerol, respectively. No differences were observed for any saturated fatty acids within the longissimus among treatment groups. However, C14:1 means differed ($P = 0.04$) and measured 0.454, 0.757, 0.751, and 0.481% (SEM = 0.087) for 0, 5, 10, and 20%, respectively. Other changes occurred in PUFA and were observed for C18:2N6 ($P = 0.02$), C20:2N6 ($P = 0.04$), C20:5N3 ($P = 0.10$), and C22:6N3 ($P = 0.06$). These changes tended to show increases with up to 10% glycerol inclusion and subsequent decreases at the 20% glycerol level. The biological significance of these changes is not yet clear. Overall, these data indicate that feeding up to 10% crude glycerol to finishing beef steers has no negative impact on certain blood lipid and energy parameters or meat quality measures related to color and lipid profile.

Key Words: Glycerol, Beef Cattle, Lipid Profile

T118 Sensorial characteristics of beef from heifers fed with different lipid supplements in the finishing phase. M. C. A. Santana*¹, P. H. M. Dian¹, R. A. Reis¹, A. V. Pires², G. Fiorentini¹, A. F. Ribeiro¹, M. A. A. Balsalobre³, and T. T. Berchielli¹, ¹São Paulo State University, Jaboticabal, São Paulo, Brazil, ²São Paulo University, Piracicaba, São Paulo, Brazil, ³Bellman, Mirassol, São Paulo, Brazil.

Meat sensorial or organoleptic characteristics are the attributes that make meat more or less appetizing; they are difficult to measure by instruments. The taste of certain bovine meat products can be influenced by the feed offered to the animal. Sensorial evaluation is important because it is capable of determining the product which will be offered to the consumer. The objective of this trial was to evaluate sensorial characteristics of beef from heifers fed different lipid supplements in finishing phase systems (FPS). The design was completely randomized in a 3×2 factorial arrangement of treatment fat supplements were, soybean grains, soybean oil and protected fat (MEGALAC-E), and two FPS, pasture or feedlot. Beef samples were appraised by 23 habitual beef consumers, randomly selected. The beef was previously thawed and roasted. Temperature was monitored using an insert thermometer until 70°C. Later, the samples were cut in cubes and identified by random numbers of three digits. The test was applied in a structured, hedonic scale of 9 points (1 displeased very much and 9 liked very much), and the flavor, texture and global acceptance attributes were evaluated. The flavor, texture and global acceptance of beef from feedlot animals were not influenced by the supplement. However, the meat from pasture systems showed a greater flavor grade and global acceptance using the MEGALAC-E and soybean oil supplement. The MEGALAC-E supplement had the highest grade for texture compared to the beef from pasture animals. The use of different supplements and FPS can influence the degree of sensorial acceptance on the part of the consumers.

Table 1. Means for the flavor, texture and global acceptance (GA) of the heifer meat from finishing phase systems (FPS) pasture (P) and feedlot (F), supplemented with soybean grains (SG), soybean oil (SO) and supplement with protected fat (ML).

Supplement/ FPS	Flavor/ P	Flavor/ F	Texture/ P	Texture/ F	GA/ P	GA/ F
SG	6.6b	7.0a	5.9b	7.3a	6.2b	7.1a
SO	7.3ab	6.4a	6.3b	6.9a	6.6ab	6.6a
ML	7.8a	7.0a	7.7a	6.9a	7.6a	7.1a

Means followed by different letters in the same column of same variables are different (P<0.05).

Key Words: Lipid, Finishing Phase, Sensorial Acceptance

T119 Carcass traits of low and high residual feed intake Nellore (*Bos indicus*) steers. R. C. Gomes*¹, R. S. Araujo¹, E. Telles¹, S. L. Silva¹, R. D. Sainz², and P. R. Leme¹, ¹University of Sao Paulo, Pirassununga, SP, Brazil, ²University of California, Davis.

Studies aiming to evaluate the effects of breeding beef cattle for the feed efficiency trait residual feed intake (RFI) have shown most efficient animals (low-RFI) may produce leaner carcasses than least efficient cattle (high-RFI). However, most investigations were carried out using *Bos taurus* breeds (Angus and Hereford) which are known to produce fatter carcasses than zebu cattle. In this sense, 72 Nellore steers (313 kg initial BW) were fed a finishing ration for 74 days and had their feed intake measured individually. Cattle were weighed every 21 d and the lowest and highest 12 RFI steers were classed as low- and high-RFI groups. The selected animals were kept in individual pens and fed until reaching market finish. At harvest, carcasses were sectioned at the 12th rib, split into bone, trimmings and retail product yield and internal visceral organs dissected and weighed. Carcass traits were adjusted to a common final BW (503 kg). There were differences (P < 0.01) between low- and high-RFI groups for DMI (9.3 vs. 11.1 kg/d), feed:gain (6.4 vs. 7.6) and RFI (-0.80 vs 0.89 kg/d), but not for ADG (1.48 vs. 1.48 kg/d), final BW (441 vs. 448 kg), hot carcass wt (310 vs. 308 kg), dressing percentage (57.3 vs. 60.9 %), kidney, pelvic and inguinal fat (5.81 vs. 6.02 kg), total visceral mass (33.0 vs. 31.1 kg), LM area (72.6 vs. 73.7 cm²), backfat thickness (6.22 vs. 6.27 mm), marbling score (379 vs. 381), trimmings (20.4 vs. 21.0% cold carcass wt) and retail product yield (62.1 vs. 61.7% cold carcass wt, P > 0.05). Low-RFI steers tended to have heavier gastrointestinal tract (P=0.09) and had less GI fat mass (P<0.01) than high-RFI cattle. The most efficient Nellore steers produced carcasses of similar quality to those obtained from the least efficient cattle. However, the most efficient cattle stored less fat on the visceral mass, suggesting the chemical composition of BW gain differs between low- and high-RFI Nellore steers.

Key Words: *Bos indicus*, Feed Efficiency, Net Feed Intake

T120 Effects of genetic group and concentrate feeding on pH and temperature of beef carcasses. I. M. de Oliveira, P. V. R. Paulino*, M. I. Marcondes, J. Cavali, S. de C. Valadares Filho, E. Detmann, L. F. Prados, V. R. M. Couto, and M. F. L. Sales, Universidade Federal de Viçosa, Viçosa, Minas Gerais, Brazil.

Post mortem muscle pH and temperature variations can result in different meat quality attributes. Beyond that, pH and temperature are often used by regulatory agencies in Brazil in order to sort carcasses for export markets. Thus, the Brazilian beef cattle industry is concerned about

the main factors that can impact the final pH and temperature of beef carcass. Therefore, this trial aimed to evaluate pH and temperature in bovine carcasses of three genetic groups (Nellore, ½ Nellore × ½ Angus and ½ Nellore × ½ Simmental), finished in a feedlot, fed diets with two concentrate allowance levels (1 and 2% of body weight) and slaughtered at 22 months old, with 412.79, 496.29 and 496.24 kg of body weight, respectively. The experiment was a factorial completely randomized design with two concentrate allowance levels, three genetic groups and six replicates. The carcasses were split and stored in a cooler at 0°C. During chilling (24 h), carcass pH and temperature was measured every 2 h in the LM region. Concentrate level and the interaction between concentrate level and genetic group were not significant (P>0.05) for both pH and temperature. There were differences (P<0.05) among genetic groups for final temperature. The final temperature of Nellore carcasses (9.90°C) was higher (P<0.05) than that observed on the ½ Nellore × ½ Angus carcasses (7.75°C), which did not differ (P>0.05) from the ½ Nellore × ½ Simmental (8.85°C). Brazilian regulations state that bovine carcass temperature should not exceed 7°C after 24 h chilling in a cooler set at 2.5°C. This did not happen as evidenced by the carcass temperatures reported above. However, since the cooler had to be open every 2 hours in order to allow the measurement of pH and temperature, this may have contributed to carcasses not reaching the target final temperature of 7°C. No difference (P>0.05) was observed for initial and final pH of the carcasses, with mean values of 6.35 and 5.47, respectively. The carcasses were adequate in quality as the final pH values were lower than the maximum value permitted (5.9-6.0).

Key Words: Nellore Cattle, Crossbred Steers, Quality

T121 Finishing changes in bovine muscle fiber types as influenced by genetic group and slaughter weight. R. Mello*^{1,2}, A. C. de Queiroz², M. H. de Faria³, P. B. Costa², F. D. de Resende³, G. F. V. Bayão², and C. A. Neves², ¹Universidade Federal de Roraima, Boa Vista, RR, Brazil, ²Universidade Federal de Viçosa, Viçosa, MG, Brazil, ³APTA, Colina, SP, Brazil.

The objective of this study was to investigate the genetic group and slaughter weight related changes of muscle fiber proportions in *Longissimus dorsi*. Thirty six young (20 mo) bulls, 18 crossbred F1 Red Angus x Nellore (½ RA ½ N) and 18 F1 Blonde D'Aquitaine x Nellore (½ BA ½ N) were used. The young bulls were finished in a feedlot and slaughtered at 480, 520 and 560 kg of body weight. A completely randomized experimental design of a 2×3 (2 genetic groups × 3 slaughter weights) factorial arrangement with six replicates was used. Muscle fiber types were determined by histochemistry and classified by a computerized image analysis system. Data were analyzed with SAS, using initial BW as a covariate. The table below shows the least-square means of muscle fiber type frequencies. The interaction between GG and SW was not significant for the different treatments. The relative frequency of type I fibers was not affected by GG and SW. The ½ RA ½ N young bulls had a higher frequency of type IIA fibers and a lower frequency of type IIB fibers than ½ BA ½ N young bulls, or vice-versa. Increases in SW were related to a higher frequency of type IIA fibers. The genetic group and slaughter weight did not influence the modulation of fibers with different twitch speeds, but influenced the proportion of fibers with different energy metabolisms. The crossbred F1 Red Angus × Nellore young bulls and heavier animals had a higher frequency of fibers with oxidative that glycolytic metabolism in the finishing phase on feedlot than F1 Blonde D'Aquitaine × Nellore and lighter animals.

Table 1. Least square means

Muscle fibers	Genetic Group (GG)		Slaughter Weight (SW)		
	½ RA ½ N	½ BA ½ N	480	520	560
Type I, %	21.8	16.9	17.3	21.5	19.3
Type IIA, %	36.8 ^A	29.6 ^B	25.4 ^b	37.8 ^a	36.5 ^a
Type IIB, %	41.3 ^B	53.5 ^A	57.3	40.7	44.2

Within a row, means followed by different capital letters and by different small letters differ ($P < .05$), respectively, among GG and SW by Tukey test.

Key Words: Feedlot, Histochemical Staining, Adenosine Triphosphatase Myofibrillar

T122 Meat cholesterol, saturated and unsaturated fatty acids of *Bos indicus* type feedlot heifers. M. P. de Oliveira^{1,3}, M. de B. Arrigoni¹, C. L. Martins¹, É. Rodrigues¹, D. D. Millen¹, R. D. L. Pacheco^{*1}, L. M. N. Sarti¹, R. S. Barducci¹, J. P. S. T. Bastos¹, T. M. Mariani¹, S. R. Baldin¹, T. C. B. da Silva², and H. N. de Oliveira¹, ¹FMVZ/UNESP, Botucatu, São Paulo, Brazil, ²Faculdade de Zootecnia/UNESP, Dracena, São Paulo, Brazil, ³Apoio FAPESP.

Information about cholesterol and fatty acids concentrations of different breed types is needed. This study, conducted at São Paulo State University (UNESP) feedlot, Botucatu Campus, Brazil, was designed to evaluate meat cholesterol, saturated (SFA) and unsaturated fatty acids (UFA) of *Bos indicus* based breed types (BT). The study used 40, 8-mo-old heifers (259.9±19.5 kg) of four BT: 10 Three-way-cross (1/2 Simmental, 1/4 Nellore, 1/4 Angus (TC)), 10 Simbrasil (5/8 Simmental, 3/8 Nellore (SB)), 10 CN (1/2 Charolais, 1/2 Nellore) and 10 CC (3/4 Charolais, 1/4 Nellore) fed for 130 days in a feedlot. Diets contained 50% high moisture corn, 21% cracked corn, 10% soybean meal, 10% sugarcane bagasse, 5% corn silage and 4% supplement (dry matter basis). Heifers were held off feed 16 hours prior to slaughter. After slaughter, LM samples were removed between the 12th and 13th ribs for muscle cholesterol concentration and for analysis of SFA and UFA of backfat. Cholesterol concentration was determined using commercial enzymatic kits. UFA and SFA were analyzed by iodine index. There was no BT effect ($P > 0.05$) on meat cholesterol (TC=73.33, SB=67.08, CN=66.73, CC=64.85 mg/100g), SFA percentage (TC=58.27, SB=57.48, CN=59.88, CC=58.05) and UFA percentage (TC=41.73, SB=42.52, CN=40.12, CC=41.95). In conclusion, the BT evaluated in this study did not affect LM cholesterol, SFA and UFA.

Key Words: Cholesterol, Fatty Acids, Heifers

T123 Effects of implanting and feeding zilpaterol on performance, carcass characteristics and subprimal meat yields of fed cows. S. Neill^{*1}, J. A. Unruh², T. T. Marston², J. R. Jaeger³, M. C. Hunt², and J. J. Higgins², ¹PIC, Hendersonville, TN, ²Kansas State University, Manhattan, ³Kansas State University Agricultural Research Center, Hays.

Our objective was to determine the effects of implanting Revalor-200[®] and feeding zilpaterol (Zilmax[®]) on the performance, carcass charac-

teristics and subprimal yields of cull cows fed for 70 d. Sixty crossbred cull cows were assigned to one of five treatments: 1) grass-fed on pasture (G); 2) concentrate-fed (C); 3) concentrate-fed and implanted with Revalor-200[®] (CI); 4) concentrate-fed and fed Zilmax[®] beginning on d 38 of the feeding period (CZ); and 5) concentrate-fed, implanted and fed Zilmax[®] beginning on d 38 of the feeding period (CIZ). Grass-fed cows were on native grass pasture and concentrate-fed cows were fed a ground sorghum and sorghum-silage diet. Concentrate-fed cows were limit-fed 11.3 kg DM/hd/d for the last 30 d of the feeding period. Although not significant, CIZ cows had the highest and G cows the lowest numerical gains for the final 34 d and total feeding period. Hot carcass weights and dressing percentages were higher ($P < 0.05$) for the concentrate-fed (C, CI, CZ, and CIZ) cows than G cows. Longissimus muscle area (LMA) was largest ($P < 0.05$) for CIZ cows and smallest for the G cows. Grass-fed cows had ($P < 0.05$) fewer kg of total subprimals and a lower percentage of total subprimals than concentrate-fed cows. In addition, CIZ cows had ($P < 0.05$) heavier total subprimal weights and a greater percentage of total subprimals than those from C cows. Feeding cull cows a concentrate diet improved carcass weight, dressing percentage, and subprimal yields compared to feeding cows a grass-based pasture diet. When feeding cull cows a concentrate diet, a combination of a Revalor-200[®] implant and feeding Zilmax[®] can maximize trimmed meat yields as indicated by dressing percentage, LMA and subprimal yields.

Key Words: Cows, Subprimal Yield, Zilpaterol

T124 Effects of implanting and feeding zilpaterol on retail display-color stability and palatability of strip loin and knuckle steaks from fed cows. S. Neill^{*1}, J. A. Unruh², T. T. Marston², M. J. Daniel², M. C. Hunt², M. E. Dikeman², and J. J. Higgins², ¹PIC, Hendersonville, TN, ²Kansas State University, Manhattan.

Our objective was to determine the effects of implanting Revalor-200[®] and feeding zilpaterol (Zilmax[®]) on retail-color display and palatability of strip loin and knuckle steaks from cull cows fed for 70 d. Strip loin (SL) and knuckle (KN) steaks were obtained from 53 crossbred cull cows assigned to one of five treatments: 1) grass-fed on pasture (G); 2) concentrate-fed (C); 3) concentrate-fed and implanted with Revalor-200[®] (CI); 4) concentrate-fed and fed Zilmax[®] beginning on d 38 of the feeding period (CZ); and 5) concentrate-fed, implanted and fed Zilmax[®] (CIZ). After 14 d of aging, trained visual panelist evaluated SL (longissimus muscle) and KN (rectus femoris and vastus lateralis) steaks daily for 5 d. Only on d 0, SL steaks from CIZ cows were darker red ($P < 0.05$) than steaks from CZ cows. No differences ($P = 0.19$) in discoloration of SL steaks were observed among treatments. For KN steaks, no differences ($P > 0.05$) in color (0-2 d) or discoloration (0-1 d) were detected among treatments early in the display period. On d 5, KN steaks from CI and CIZ cows were darker red ($P < 0.05$) than those from G cows. Also on d 5, KN steaks from CI and CIZ cows were ($P < 0.05$) more discolored than steaks from CZ, C and G cows. Sensory panelists found 14-d aged SL steaks from CI, C, and G cows were more tender ($P < 0.05$) than steaks from CIZ cows; and steaks from C and G cows were ($P < 0.05$) more tender than steaks from CZ cows. Off-flavors were highest ($P < 0.05$) for SL steaks from G cows. No tenderness differences ($P > 0.05$) were found among treatments for KN steaks. Feeding Zilmax[®] to Revalor-200[®] implanted cows resulted in SL steaks that were considered less tender. However, sensory panel and WBSF data indicate that further postmortem chemical and/or mechanical

tenderization would be recommended for steaks from all treatments to improve tenderness and acceptability.

Key Words: Cows, Sensory, Zilpaterol

T125 Influence of sarcomere length on aging and hydrodynamic pressure processing of beef muscle. B. Bowker*, J. Eastridge, E. Paroczay, and M. Solomon, *USDA-ARS, Beltsville, MD.*

The interacting effects of sarcomere length and tenderizing treatments on proteolysis and meat texture are not well understood. Extent of thick and thin filament overlap was hypothesized to influence the protein degradation and tenderness improvements associated with postmortem aging and tenderization techniques. The objective of this study was to determine the influence of sarcomere length, hydrodynamic pressure processing (HDP), and aging on the proteolysis and texture of beef longissimus muscle. One side of each beef carcass (n=4) was subjected to hip suspension (HS) while the opposite side was normally suspended (NS). At 48 h postmortem, longissimus muscles were removed and cut into anterior and posterior halves assigned HDP and control treatments. Steaks for Warner-Bratzler shear force (WBSF) determination and protein analysis were removed and aged at 4°C until 3, 7, and 14 days postmortem. Sarcomere length was greater (p<0.0001) in HS samples than NS samples (2.35 vs. 1.73 μm). WBSF was lower (p<0.0001) in HS samples compared to NS samples, regardless of HDP treatment or aging period. NS samples exhibited a greater (p<0.0001) decrease in WBSF with aging than HS samples. HDP treatment decreased (p<0.0001) WBSF in NS samples but had minimal effects on HS samples. SDS-PAGE analysis of whole muscle protein extracts revealed significant suspension method by aging interactions and strong aging effects. In HS samples there was a greater (p<0.05) decrease in the intensity of the 38 kDa band (relative to the actin band intensity) from 3 to 14 days than in NS samples. The intensity of a 95 kDa band was not influenced by aging in NS samples but was diminished by day 14 in HS samples. The intensity of several smaller bands (<14 kDa) in HS samples increased (p<0.05) more with 14 days of aging than in NS samples. Bands corresponding to 110 and 30-32 kDa increased with aging across all treatments. Overall data suggest that sarcomere length plays a major role in determining a muscle's potential for tenderization and further suggests that the impact of proteolysis on tenderness is mediated by sarcomere length.

Key Words: Sarcomere Length, Aging, Hydrodynamic Pressure Processing

T126 Influence of fiber type on palatability attributes of beef round muscles. M. J. Anderson*, E. Steadham, C. Fedler, K. Prusa, S. M. Lonergan, and E. Huff-Lonergan, *Iowa State University, Ames.*

Differences between muscle fiber types, including fiber diameter, method of metabolism, and glycogen content, can potentially affect several aspects of meat quality. The objective of this study was to determine the influence of fiber type, as defined by myosin heavy chain (MHC) isoforms, on palatability attributes of underutilized muscles from the round. Longissimus dorsi (LD), gracillus (GR), adductor (AD), sartorius (SAR), semimembranosus (SM), vastus lateralis (VL), and vastus intermedius (VI) were removed from 10 beef cattle carcasses 1d postmortem. Instrumental texture (star probe), sensory characteristics, pH, western

blotting for troponin-T degradation, and SDS-PAGE to determine the percentage of type I and II MHC isoforms were collected. Three bands were detected in the troponin-T western (Upper intact band, UI; Lower intact band, LI; 30kDa degradation product band, 30kDa) and compared to a 7d postmortem LD reference sample. A sample from bovine diaphragm served as a reference for type I myosin heavy chain. The VI had the highest percentage (P<0.01) of type I fibers and the lowest percentage (P<0.01) of type II fibers when compared to all other muscles (type I, 62.1%; type II, 37.9%). Across all muscles, the proportion of type I fibers was correlated to the intensity of the LI (r = -0.27; P=0.02), the intensity of the UI (r = -0.48; P<0.01), and juiciness (r = 0.26; P=0.03). The intensity of the 30kDa band tended to be correlated to pH (r = -0.22; P=0.07) and the intensity of the UI was correlated to star probe (r = 0.25; P=0.03). The data show that juiciness is associated with fiber type. While effective in the LD, the utility of troponin-T degradation as an indicator of degradation in all muscles may not be feasible. This is potentially due to the specificity of the antibody for individual troponin-T isoforms.

Key Words: Beef Round, Myosin Heavy Chain, Troponin-T

T127 Prevention of internal premature browning in cooked steaks packaged in high-oxygen modified atmosphere by increasing reducing ability through lactate enhancement. Y. H. Kim*, J. T. Keeton, and J. W. Savell, *Texas A&M University, College Station.*

Meats with higher concentrations of oxymyoglobin can develop brown color quicker at a lower temperature resulting in prevalence of "premature browning (PMB)" in cooked meat. Consequently, PMB defects would be a significant food safety issues if consumers rely on appearance of internal meat color for cooked meat as a measure of degree of doneness. A brown color due to metmyoglobin formation can be retarded through the metmyoglobin reducing activity (MRA) of muscle. NADH is the primary substrate for MRA. Lactate injection has been reported to improve color stability by the conversion of lactate to pyruvate via increased lactate dehydrogenase (LDH) flux and concomitant regeneration of NADH. Thus, it can be hypothesized that lactate inclusion may prevent PMB by increasing MRA through replenishing NADH. The objective of this study was to determine the effects of lactate inclusion on internal cooked color development of steaks packaged in high-oxygen MAP.

Eight beef strip loins were divided into 4 equal width sections, and one of four treatments (control, 0.3% phosphate, 2.5% L-lactate, and 2.5% D-lactate) randomly assigned to each loin section. Loins were injected at 10% of their raw weight. Injection with D-lactate was used to test our hypothesis because LDH only reacts with L-lactate to regenerate NADH. Steaks packaged in high-oxygen MAP were stored in the dark at 1°C for 10 days. Instrumental internal color of raw and cooked steaks, total reducing activity (TRA), and NADH concentration were measured. Data were analyzed by using the Mixed procedure of SAS. LSMeans were separated (P<0.05) by using least significant differences. Cooked steaks enhanced with 2.5% L-lactate maintained significantly higher a* values (redness), higher TRA, and had a higher NADH concentration as compared to other treatments. Enhancement with 2.5% D-lactate did not affect cooked color, TRA, and NADH. These results confirm that lactate inclusion prevents PMB of steaks packaged in high-oxygen MAP by increasing reducing ability through the conversion of lactate to pyruvate and the concomitant regeneration of NADH.

Key Words: PMB, Lactate, Color