60 weanling CD rats (5 wk old; 75 g BW) were euthanized and anterior pituitary glands removed. Individual cells were dispersed with dispase and cells were maintained at 37C (humidified atmosphere; 95% air: 5% CO2) in Dulbecco modified Eagle's medium for 24 h. Cells were then treated with one of the following (2 wells /treatment; replicated in 3 experiments): 1. controls; 2. 10 nM T_3; 3. 50 M DTPA; 4. 10 nM T_3 plus 50 M DTPA; and 5. 10 nM T_3, 50 M DTPA and 40 M zinc sulfate. Cells were incubated for 48 h prior to RNA extraction. Reverse transcription (RT) PCR, with specific primers for GH and thyroid stimulating hormone (TSH), was used to measure mRNA levels. Comparisons with control gene-specific primers RPL-32 and β-actin were used to calculate mRNA levels of expression for GH and TSH, respectively. To evaluate RT-PCR, preliminary experiments were performed with GH3 cells. Results with RT-PCR and the GH primer paralleled previous results using Northern analysis, showing that expression DTPA and T_3 stimulated GH mRNA expression. TSH was measured to confirm the viablity of the anterior pituitary cells. As expected, T_3 inhibited TSH mRNA expression 50% compared to control cells. Expression of TSH mRNA was greater in DTPA treated cells compared with controls ($p<.01$), but was lowered by combination with T_3 and by combination with T_3 and zinc. These results confirm that the anterior pituitary cells are viable and responsive. In these same cells DTPA alone reduced GH mRNA levels by 25% ($p=.03$). However, in contrast to GH3 cells, DTPA did not stimulate GH mRNA levels in T_3-treated pituitary cells ($p=.18$). In conclusion, while zinc chelation increases TSH mRNA, in the presence or absence of T_3, it does not affect the GH mRNA in primary rat anterior pituitary cells in the same manner as GH3 cells.

Key Words: Rat, Growth hormone, Thyroid hormone

1806 Effects of dietary conjugated linoleic acid (CLA) on the composition and function of peripheral blood mononuclear leukocyte populations in heifer calves. J.M. Smith*[1], B.J. Nonnecke[2], M.E. Van Amburgh[1], B.A. Pesch[2], and J.A. Harp[2], [1]*Cornell University, Ithaca, NY,* [2]*National Animal Disease Center (NADC), USDA, ARS, Ames, IA.*

At approximately 2.5 months of age, heifer calves, raised and housed at the Cornell University Dairy Teaching and Research Facility, began receiving a diet formulated to support 1 kg/d gain (controls, n = 6) or a diet containing protected CLA (treated, n = 6). Total CLA was included in the diet at 1% of DM intake. The CLA-supplemented diet was formulated to support the same levels of ME and MP allowable gain as the control diet. Peripheral blood was collected at the initiation of the study (100 kg BW) and at 6.5 (200 kg BW) and 9.5 (300 kg BW) months of age. Anti-coagulated blood was maintained at room temperature and shipped overnight to the NADC where the composition and function of circulating mononuclear leukocyte (PBML) populations were evaluated. The composition of PBML populations was evaluated by flow cytometry. The total number of PBML was unaffected ($P > 0.05$) by dietary treatment or age. Percentages of CD3+ T cells (and CD4+, CD8+, and $\gamma\delta$ T cell subsets) and B cells in the PBML population were unaffected ($P > 0.05$) by dietary CLA; however, the proportion of T cells did increase ($P < 0.01$) with age. Percentages of PBML expressing activation antigens (i.e. MHC class II antigen and interleukin-2 receptor) were also unaffected by dietary CLA or age. Leukocyte function was evaluated in vitro by measuring interferon-γ (IFN-γ), nitric oxide, and tumor necrosis factor-α secretion in PBML cultures, both unstimulated and mitogen-stimulated (i.e. with pokeweed mitogen (PWM), concanavalin A, and phytohemagglutinin-P). In general, dietary CLA did not affect these functions. The only exception was greater IFN-γ secretion by PWM-stimulated cells from heifers supplemented with CLA. Although these data suggest dietary CLA had minimal effect on the composition and function of PBML from healthy calves, additional research is needed to determine if dietary CLA would benefit calves experimentally or naturally infected with pathogens causing significant morbidity or mortality in the field.

Key Words: Conjugated linoleic acid, Immune function, Dairy heifers

1807 Feeding conjugated linoleic acid to reduce the impact of an infectious disease challenge in growing swine. J.A. Brown*, G.W. Almond, S.A. Mathews, W.T. Oliver, and R.J. Harrell, *North Carolina State University, Raleigh, NC.*

Respiratory diseases, particularly in the grow-finish phase, account for considerable economic loss in the swine industry. Studies in chicks and rodents have shown dietary conjugated linoleic acid (CLA) reduced the catabolic effects of a noninfectious inflammatory challenge. Our objective was to maintain performance and(or) reduce the duration of lower performance during an infectious disease challenge of porcine reproductive and respiratory syndrome virus (PRRSV) and *M. hyopneumoniae* (*M. hyo.*) by supplementing diets with CLA. Pigs were weaned from the sow at 12 days of age and reared in isolated facilities to ensure high health status. At 26.7±0.6 kg BW, 16 barrows were moved to metabolism cages and randomly assigned to a 2x2 factorial arrangement: diet (0 or 2% CLA-60) and disease challenge (uninfected or infected with PRRSV and *M. hyo.*). Pigs were allowed a 2 week adjustment period to their respective diet prior to infection. Pigs were then inoculated with PRRSV and *M. hyo.*, and control pigs were given sterile media. Blood samples were taken weekly, and total urine and feces were collected during the third week post infection. Pigs were euthanized at a constant BW of 63.4±1.1 kg. PRRSV titers were not present initially, and only infected pigs were positive at the conclusion of the trial. In addition, only infected pigs had lung lesions typical of *M. hyo.* No differences in average daily feed intake, efficiency of gain, N-retention, plasma urea nitrogen, or total blood protein were found ($P>0.11$). Infected pigs had lower blood albumin ($P<0.03$) and tended to have reduced ADG ($P<0.06$) compared to uninfected pigs, but dietary CLA did not attenuate the reduced growth performance ($P>0.20$). Results thus far suggest that CLA does not attenuate the reduced growth performance associated with an infectious disease challenge. However, beneficial effects of CLA may have been compromised by the lack of severity of the disease challenge.

Key Words: Swine, Conjugated linoleic acid, Disease

AMSA/ASAS Meat Science and Muscle Biology

1808 Prediction of the fat content of pork carcasses based on cross-sectional region analysis of dual energy X-ray absorptiometry scans. A. D. Mitchell*[1], A. M. Scholz[2], and V. G. Pursel[1], [1]*USDA, Agricultural Research Service, Beltsville, MD ,* [2]*Ludwig Maximillians University-Munich, Oberschleissheim, Germany.*

Dual energy X-ray absorptiometry (DXA) can be used to measure pork carcass composition by performing a total scan of the half-carcass. The scan can be analyzed for total or regional fat, lean, and bone mineral content, but is too slow for on-line slaughter application. The purpose of this study was to determine the feasibility of predicting carcass composition based on a single cross-sectional measurement. A total of 252 right half-carcasses (42.7 ± 5.2 kg) were scanned by DXA. The DXA scans were analyzed for percentage fat in the entire half-carcass as well as the shoulder, ham, loin, and side regions. A total of 14 cross-sections (57.6 mm wide) were analyzed: 6 in the shoulder/thoracic region, 3 in the loin region, and 5 in the ham region. Regression analysis was used to compare the DXA fat percentage measurements in the total carcass with those of the various regions. The mean fat content of the half-carcasses was 24.1 ± 7.0%; shoulder region, 23.8 ± 6.7%; ham region 22.9 ± 6.7%; loin region, 23.7 ± 7.6%; and the side region 27.9 ± 7.6%. The correlation (R^2) between the fat content of a single cross-sectional slice and total fat content ranged from 0.908 to 0.976. The highest correlations were in the area of the last ribs. Based on previous results, it is estimated that a single slice could predict the percentage of carcass fat by chemical analysis with an R^2 of 0.80. The highest correlations between single cross-section and region analysis were: shoulder, 0.978; ham, 0.972; loin, 0.973; and side, 0.959. These results indicate that carcass fat percentage can be measured by performing a single-pass cross-sectional scan that would be compatible with on-line processing.

Key Words: Carcass Composition, DXA, Swine

1809 Effect of supplemental fat on growth performance and quality of beef from steers fed barley-potato product finishing diets I. Feedlot performance, carcass characteristics, and appearance. M. L. Nelson*, J. R. Busboom, D.J. Marks, L.F. Falen, and J.D. Cronrath, *Washington State University, Pullman, WA/USA*.

To measure effects of dietary fat on feedlot performance, carcass characteristics, and beef appearance, one hundred sixty-eight crossbred beef steers (318 ± 2.8 kg) were allotted within weight block (3) to a randomized complete block design with a 2 X 3 + 1 factorial arrangement of dietary treatments. Main effects were level of yellow grease (0, 3, or 6%) and level of alfalfa hay (3.5 or 7%) with the added treatment of 6% tallow and 7% alfalfa hay in barley-based diets containing 15% potato by-product and 7% supplement fed for 165 d. Dietary treatment did not affect (P > .10) DM intake (8.2 ± .17 kg/d), ribeye area (87.1 ± .58 cm^2), beef brightness (2.5 ± .06) on a 1 (very dull) to 5 (very bright) scale, or beef texture (2.6 ± .05) on a 1 (very coarse) to 5 (very fine scale). Level of yellow grease linearly increased (P < .05) average daily gain from 1.5 to 1.6 ± .16 kg/d, diet NE_m from 2.4 to 2.6 ± .06 Mcal/kg, and diet NE_g from 1.7 to 1.9 ± .04 Mcal/kg, and kidney, pelvic and heart fat from 2.1 to 2.4 ± .06%. Level of yellow grease linearly decreased (P < .05) feed-to-gain from 5.9 to 5.5 ± .16, beef firmness score from 3.0 to 2.8 ± .07 on a 1 (very soft) to 5 (very firm) scale, and fat luster score from 3.1 to 2.8 ± .09 on a 1 (very dull) to 5 (very lustrous) scale. Level of alfalfa hay by itself did not affect any of the measurements, however it interacted with level of yellow grease on backfat, marbling score, beef color score, and percentage USDA Choice. Backfat increased with yellow grease in 3.5% but not in 7% alfalfa diets. Marbling and beef color score were maximized in the 3.5% alfalfa hay diet but minimized in 7% alfalfa hay diet that contained 3% yellow grease. Steers fed tallow had lower (P < .10) marbling scores (272 vs 295 ± 5.54 where 300 was choice 0), percentage USDA Choice (21 vs 43 ± 7.71%) but greater (P < .10) beef firmness score [3.0 vs 2.7 ± .10) on a 1 (very soft) to 5 (very firm) scale] than those fed yellow grease. Therefore, yellow grease increased diet energy which improved gain, feed-to-gain, and slightly increased carcass fatness. Yellow grease also increased marbling and decreased beef firmness and fat luster.

Key Words: Barley, Yellow grease, Tallow

1810 Catalysis of meat tenderization during postmortem aging by calpain 3 (p94). M. A. Ilian*, A. E. Bekhit, and R. Bickerstaffe, *Lincoln University*.

The biochemical basis of postmortem tenderisation of meat is the proteolysis of certain muscle structural proteins by the calpain proteolytic system. In mammalian skeletal muscle, calpains comprise the ubiquitous calpains 1 and 2 and the tissue-specific calpain 3 or p94. The results of our previous studies on the role of calpains in meat tenderization revealed, for the first time, a strong correlation between the variation in meat tenderness and the expression of calpain 3 at the mRNA and protein levels. Furthermore, it was observed that calpain 3 was terminally activated, like calpain 1, during postmortem storage. To investigate further the mechanism of meat tenderisation, we have determined the kinetics of; i) meat tenderisation, ii) myofibrillar fragmentation index (MFI), iii) proteolysis of nebulin and, iv) the activation of calpain 3 in the longissimus over a period of 7 days post slaughter. The results indicate there is agreement between the kinetics of tenderization and the kinetics of MFI, nebulin and the activation of calpain 3. The correlation coefficients between the kinetics of meat tenderization and the kinetics of MFI, nebulin and the activation of calpain 3 were 0.75, -0.77, and -0.86 respectively. These results support the statement that the biochemical basis of postmortem tenderisation of meat is the proteolysis of certain muscle structural proteins, such as nebulin, by the calpain proteolytic system. At this point in time, we can not be certain which calpain is rate limiting in postmortem tenderization, but the results support a potential role for calpain 3 in this process.

Key Words: Meat tenderization, proteolysis, calpain 3(p94)

1811 Effect of transport temperature and post-slaughter chilling on channel catfish fillet quality. B. G. Bosworth*[1], W. R. Wolters[1], J. Silva[2], and R. Chamul[2], [1]*USDA-ARS, Stoneville, MS,* [2]*Mississippi State University, Starkville, MS*.

Objectives were to determine effects of transport water temperature and post-slaughter chilling on channel catfish fillet quality. Channel catfish (mean weight = 0.67 kg) were harvested from commercial ponds and transported in a 4-compartment trailer at a typical commercial transport density (440 kg fish/m^3 water). Each compartment was assigned to one of four treatments with 3 replicate trials: Treatment 1 (T1) = transport water temperature 20°C, fillets chilled (typical industry practice); Treatment 2 (T2) = transport water temperature 20°C, carcasses chilled prior to filleting; Treatment 3 (T3) = transport water temperature 10°C, fillets chilled; and Treatment 4 (T4) = transport water temperature 1°C (slush ice), fillets chilled. After 3.5 h transport, 10 fish from T1, T2, and T3 were returned to pond water to simulate fish being rejected at the plant and returned to the producer. Remaining fish were stunned by electricity and processed. Fillet texture, color (CIE L*, a*, b*), purge-loss, and pH were measured. Mortality of fish returned to pond water was higher (P<0.05) in T4 (97%) than in T1 (3%) and T3 (3%). Fillet texture (FTC Texture Meter) was not different (P>0.05) among treatments. Purge-loss during 3 d iced-storage was highest (P<0.05) in T1 (1.46%), but not different among T2 (1.08%), T3 (1.10%), and T4 (1.00%). Fillet L* values were higher (P<0.05) for T1 (54.7) and T2 (53.8) than for T3 (51.6) and T4 (51.8). T3 fillets had lower a* values (-2.0) than T1 (-1.4), T2 (-1.6) or T4 (-1.6). Fillet b* values were highest for T1 (2.0), intermediate for T2 (1.0) and T4 (1.2), and lowest for T3 (0.4). Purge-loss was positively correlated with L*, a*, and b* values (p < 0.001). Ultimate pH of fillets was higher (P>0.05) for T1 (7.00) and T2 (7.00) than for T3 (6.83) and T4 (6.84). We conclude that hauling catfish at 10°C and/or chilling carcasses prior to filleting could improve fillet quality. Cost/benefits of transport at 10°C or chilling carcasses before filleting need to be determined.

Key Words: catfish, fillet quality, transport

1812 Effects of pre-slaughter holding time on dressing-out percent and meat quality for bulls and steers. R. W. Purchas*, D. L. Burnham, and S. T. Morris, *Massey University, Palmerston North, New Zealand*.

Carcass and meat quality characteristics were compared for Angus and Angus-cross bulls (n=58) and steers (n=59) held at the meat plant for either 4h (n=59) or 28h (n=58) before slaughter. All cattle had been finished on pasture and the fasting time prior to arrival at the plant was c. 2h. At the plant cattle had access to water but not feed. Losses in live weight from farm to the time of slaughter were more than twice as high for the 28h group (46.8 vs 21.6 kg; P < 0.001), and the weight-adjusted dressing-out percent values based on on-farm weights were significantly lower for the 28h group (50.73 vs 51.99; P < 0.001). This indicated that the increased holding time led to a carcass weight loss that corresponded to 6.9 kg for an animal that weighed 550 kg on the farm. The extent of weight loss was similar for bulls and steers. Carcass composition and shape traits were unaffected by holding time. Meat quality was assessed on samples of longissimus thoracis muscle between ribs 6 and 12. Ultimate pH (pHult)was higher for the 28h group than the 4h group for the bulls (5.75 vs 5.57; P < 0.05) but not the steers (5.47 vs 5.46). Measures of sensory tenderness did not differ between the two holding-time groups either before or after adjustment for pHult, even though pHult had a significant effect on all measures of meat tenderness. Objective measures of tenderness by Warner-Bratzler shear or by MIRINZ tenderometer also did not differ between the two holding-time groups either with or without pH adjustment. Sensory juiciness scores were unaffected by holding time, but pH-adjusted cooking losses and expressed-juice values were lower for meat from the 28h-hold group suggesting some muscle dehydration. Increasing the holding time for cattle at the meat plant from 4 to 28 hours is likely to lead to carcass weight losses, but effects on meat quality are likely to be minimal provided high-pH beef is avoided.

Key Words: Beef Quality, Dressing-out Percent, Holding Time

1813 Instrumental and chemical characteristics, calpastatin mRNA genic expression and myofibrilar protein concentration in chilled meat of feedlot Brazilian Superyoung cattle *Bos taurus* × *Bos indicus* 24h postmortem. L. A. L. Chardulo*[1], J. A. Ferro[2], A. C. Silveira[1], L. R. Furlan[1], M. D. B. Arrigoni[1], H. N. Oliveira[1], M. I. T. Ferro[2], and C. Ludovico[1], [1]*UNESP - Botucatu, SP/Brazil,* [2]*UNESP - Jaboticabal, SP/Brazil.*

Two hundred male and female crossbred animals were used. These were products of a cross between Aberdeen Angus, Charolais, Gelbvieh, Simmental and Hereford males and 1/2 Simmental × 1/2 Nellore crossbred females, weaned by creep-feeding method and kept in feedlots afterwards. The animals were slaughtered when weighed more than 440 kg (males) and 400 kg (females). One-gram samples of the Semitendinosus were collected for calpastatin mRNA expression analysis by dot blot and myofibrillar protein quantification by SDS-PAGE. Samples of the longissimus were collected between the 12^{th} and 13^{th} ribs for chemical and instrumental analysis of the meat. Experimental design was completely randomized. In chemical and compositional analysis of the meat, the Aberdeen Angus animals had higher subcutaneous and intramuscular fat ($p<.01$), as well as lower pH, ribeye area and shearing force ($p<.01$). Internal meat temperature 15h postmortem was higher for Aberdeen Angus animals ($p<.05$). Female showed higher fat deposition on the meat, pH and temperature ($p<.01$) but lower ribeye area ($p<.01$). No differences ($p>.05$) were observed for color characteristics, protein, humidity and losses during cooking for the different genetic groups, ages and sexes. There was also no differences ($p<.05$) in the quantity of calpastatin mRNA between the different breeds and sexes, although, Aberdeen Angus animals had lower myofibrillar protein levels ($p<.01$), denoting a higher postmortem proteolysis rate. The ability of Aberdeen Angus breed in producing tender meat in the Brazilian Superyoung System may be related to a higher fat deposition in carcass and meat, what consequently gives a better protection against the rapid cooling procedure studied herein.

Key Words: Young crossbred cattle, Calpastatin, Myofibrilar proteins

1814 Abundance and cellular distribution of the calpain proteolytic system proteins in the Longissimus of the ovine. R. Bickerstaffe*[1], M. Ilian[1], and H. Sorimachi[2], [1]*Lincoln University,* [2]*The University of Tokyo.*

The calpain proteolytic system in mammalian skeletal muscle is a family of Ca^{2+} -activated neutral thiol endopeptidases classified as ubiquitous (calpains 1 and 2) and tissue-specific (calpain 3 or p94). Calpains 1 and 2 are composed of 80 kDa catalytic subunits, which are products of separate genes, and a 30-kDa regulatory subunit, which is identical in both enzymes. The structure of calpain 3 differs from calpains 1 and 2 in the presence of 3 unique regions that are expected to convey functional specificity, and in the absence of the small subunit. Another distinguishing feature between the ubiquitous calpains and calpain 3 is that, unlike calpains 1 and 2, calpain 3 is not inhibited by calpastatin (a specific endogenous inhibitor protein). Several studies have indicated that the calpain proteolytic system plays major roles in muscle growth and development in health and disease. The challenge is that the physiological functions of the various muscle calpains remain unknown. As a step toward the elucidation of the specific function of the individual calpains in skeletal muscle we developed western assay to quantify the protein level of calpain 1, calpain 2, calpain 3 and calpastatin in ovine skeletal muscle. The method is based on constructing standard curves using predetermined amounts of pure calpain proteins. We used the above method to determine the abundance and cellular distribution of the calpain proteolytic system proteins in the longissimus (LD) of the ovine. The results (average ± SD, n = 4) revealed that the level (fmole/mg tissue) of calpain 1, 2, 3 and calpastatin in the LD was 309 ± 106, 846 ± 108, 4180 ± 322, and 487 ± 56, respectively. Cellular distribution of the calpains in the LD indicated that calpain 2 and calpastatin are present in the sarcoplasmic fraction but not in the myofibrillar fraction. However, calpains 1 and 3 are present in the sarcoplasm and at the myofibril at 71:29 and 18:82 ratios, respectively. Based on the pattern and level of expression, we infer that the calpains are performing different functions in the LD and that calpains 1 and 3 may be involved in the metabolism of myofibrillar proteins.

Key Words: Calpain, abundance, muscle

1815 Effects of marination on the processing parameters and palatability of bison top round. J.S. Dhanda*[1], R.B. Pegg[1], J.A.M. Janz[2], J.L. Aalhus[3], and P.J. Shand[1], [1]*University of Saskatchewan, Saskatoon, SK, Canada,* [2]*University of Alberta, Edmonton, AB, Canada,* [3]*Agriculture and Agri-Food Canada Research Centre, Lacombe, AB, Canada.*

Injection of phosphate and salt containing marinades increases the palatability of a wide variety of meat products, but many of these studies have been based on domestic livestock species. The present study was conducted to investigate the effects of marination on the palatability of bison top round steaks/roasts cooked by two cooking methods (dry or moist-heat) and to two endpoint temperatures (71^oC or 77^oC). Twenty paired *semimembranosus* muscles were obtained from 10 male bison: each of these muscles was divided longitudinally into two sections. One section was injected to 110% of its original weight to contain 0.5% sodium chloride and 0.3% sodium tripolyphosphate, while the other was kept as a non-injected control. The steaks/roasts obtained from control and injected sides were used for color appraisal, tenderness evaluation and consumer acceptance studies. Bison steaks (stored at 31^oC and under 975 Lux) held a bright red color for 2 days, but after that discoloration became evident. HunterLab a^* (redness) values did not change significantly between treatments; however, injected steaks had lower L^* (lightness) and b^* (yellowness) values ($P<0.01$) compared to control steaks. Cook yields for the steaks/roasts from the injected sections were significantly higher compared to those from control non-injected sections when cooked to either 71^oC or 77^oC. Injected steaks/roasts had significantly lower shear force values (63.9N) compared to controls (102.3N). Bison samples cooked by moist-heat (water bath) had significantly lower cooking losses and shear values compared to those cooked by dry-heat (oven broiling). As expected steaks/roasts were more tender and had better cook yields when processed to a lower temperature (71^oC) compared to an internal temperature of 77^oC. A panel of 80 consumers revealed that injected steaks had better acceptance in terms of tenderness, juiciness and flavor compared to non-injected ones. The findings of the present study suggest that marination by injection has a great deal of potential in improving the palatability of lesser value cuts of bison.

Key Words: Marination, Palatability, Bison top rounds

1816 Antihypertensive activities of enzymatic hydrolysates of porcine skeletal muscle proteins. Y Nakashima*, K Arihara, S Ishikawa, and M Itoh, *Kitasato University, Towada-shi, Japan.*

Inhibitors of angiotensin I-converting enzyme (ACE) have been shown to have antihypertensive activities and have been utilized for pharmaceuticals and physiologically functional foods. Several ACE inhibitory peptides, which have the antihypertensive activity, have been found in the enzymatic hydrolysates of foodstuffs, such as milk proteins. However, little is still known about the derivation of ACE-inhibitory and antihypertensive activities from meat proteins. The objective of this study was to investigate these activities of the enzymatic hydrolysates of porcine skeletal muscle proteins. Porcine skeletal muscle myosin was hydrolyzed by one of eight kinds of proteases. Among these hydrolysates, thermolysin digests showed the highest ACE inhibitory activity. The single oral administration of thermolysin digest of myosin to spontaneously hypertensive rats (SHR) significantly decreased their systolic blood pressure. Two ACE inhibitory peptides, named myopentapeptides A and B, Met-Asn-Pro-Pro-Lys and Ile-Thr-Thr-Asn-Pro, were purified from thermolysin hydrolysate of myosin by HPLC with reversed phase mode. Of the synthesized two myopentapeptides and six tripeptides, which have parts of the sequences of myopentapeptides, four peptides (myopentapeptides A and B, Met-Asn-Pro, Pro- Pro-Lys) demonstrated antihypertensive activities by their single oral administration in SHR significantly. Porcine skeletal muscle actomyosin and its thermolysin hydrolysate were tested for the activity of preventing hypertension by their long-term oral administration in SHR. The antihypertensive activity was demonstrated by the administration of thermolysin digest. This study demonstrated that ACE-inhibitory and antihypertensive activities can be generated from meat proteins by enzymatic hydrolysis. Utilization of enzymatic hydrolysates of meat proteins and corresponding peptides could lead to the development of new healthy meat products.

Key Words: Antihypertensive activity, Skeletal muscle proteins, Peptide

1817 Oxidative differentiation in muscle of small and large pig fetuses in late gestation. C. Ashton* and N. Stickland, *The Royal Veterinary College, London, UK, NW1 0TU.*

Muscle tissue consists of muscle fibres, which form in a biphasic manner. Initially, a myoblast population fuses to generate primary fibres, providing a surface on which a second population of myoblasts fuse to form secondary fibres. Secondaries are first observed at about 54 days in the pig. In the pig, muscle fibre hyperplasia is completed by about day 90 of gestation. The adult pig semitendinosus muscle is composed of a deep (oxidative rich) and a superficial (less oxidative) area. Prenatal differentiation in terms of contraction speed has been identified. However, oxidative (metabolic) differentiation has not been shown prenatally. The semitendinosus muscles from 11 pairs of the smallest and largest pig fetuses at 80-100 days gestation were removed. Succinic dehydrogenase (SDH) staining was performed on complete frozen transverse sections. Optical density measurements were recorded over the entire section from the most superficial to the deepest border. Although, there was no significant difference ($P>0.05$) between the muscles of littermates, a significant difference ($P<0.01$) between the superficial and deep portion of the muscle was observed. The results suggest that oxidative muscle differentiation does occur before birth. In fact the results imply that oxidative differentiation is occurring as early as day 80, prenatally. Both the deep (mean OD for small and large piglets = 190.188) and superficial (mean OD for small and large piglets = 193.945) portions of muscle were still very oxidative at this stage. However, the results have shown that some significant differentiation was occurring, within individual semitendinosus muscles, but not between littermates.

Key Words: Oxidative differentiation, Muscle, Prenatal

1818 Omega-3 fatty acids and meat lamb quality. F Nicastro*[1], L Zezza[1], and R Gallo, *Department of Animal production, University of Bari, Bari, Italy.*

Nowadays meat is often seen as one of the factors that are responsible for a negative, unhealthy lipidic contribution. The composition of fatty acids in animals largely depends on the type of diet, especially the quality of dietary fat. We must use the omega-3 fatty acids for a more protective and healthier diet, to grant them the completion and physiological control of several functions of the organism. Twenty 30 d old Delle Langhe bred wether lambs were divided into two groups of 10 and housed indoors for eight weeks. The two groups received hay ad libitum and the first group was fed a basal diet of commercial concentrate (Control), while the second group received a diet supplemented with 3% fish oil (Omega 3). At the end of feeding, the lambs were fasted overnight and slaughtered. Hot carcass weight was measured at 45 minutes post mortem and carcasses chilled overnight. The right sides of the carcasses were weighted and cut into wholesale cuts. The weights were expressed as a percent of the cold carcass weight. The loin and leg cuts were separated in lean, bone and fat. Samples for meat quality investigations were removed from the longissimus thoracis for meat color and shear measurements. Meat color was taken using CIE methods (L, a, b) and the shear force was measured from the LT muscle raw and cooked. Objective measurements showed a significant ($P < .05$) increase in redness (a), in lambs fed fish oil whereas the control group was much lighter (L), than the group fed omega-3. The raw and cooked muscle of the lambs fed with omega-3 had significant ($P < .01$) effect on shear force (2.95 and 2.85 kg core for raw and cooked muscle respectively), so the loin tenderness was positively affected. In the leg the percentage of lean decreased with the omega-3, whereas fat markedly increased ($P < .05$). Lean and fat percentages of the loin are also influenced by the lamb's feeding, but with an opposite trend. In fact the lean goes up from 48.15 to 52.63% ($P < .05$), whereas the fat decreased. The omega-3 fatty acids, in the amount used in this study, have little influence in the cuts of carcasses.

Key Words: Lamb, Diet, Meat quality

1819 *In Ovo* Manipulation of Posthatch Growth in the Turkey. A. R. Somaiya* and N. C. Stickland, *Royal Veterinary College, London, UK.*

In fish, temperature has been successfully used to alter muscle tissue characteristics and postnatal growth. The main aim of these studies was to quantify the difference in muscle tissue parameters in turkey poults from eggs incubated at different temperatures, both higher and lower than the optimum 37.5°C. Control eggs were set at 37.5°C for the duration of the 28 day incubation period. The time periods chosen to apply the experimental temperatures (38.5°C and 35.5°C) were for periods of four days, either 0-4, 5-8, 9-12, 13-16, 17-20, 21-24 and 25-28 days of incubation. Semitendinosus (ST) and pectoral muscles were taken and transverse sections were cut from the whole ST and a $1cm^2$ sample of pectoral muscle at 16 days posthatch. The muscles were sectioned and stained to determine ST muscle area, total nuclei and fibre number and pectoral nuclei and fibre number densities. It was found that application of the lower temperature at the beginning of the incubation period (days 5-8) produced a decrease ($P < 0.05$) in ST weight (.50 vs .65), a decrease ($P < 0.05$) in total nuclei number per section (69,000 vs 76,500), but an increase ($P < 0.05$) in the total number of fibres (130,000 vs 110,000), compared to control. Conversely, application of the higher temperature during the same time period produced an increase ($P < 0.05$) in ST total nuclei number per section (100,000 vs 76,500), a decrease ($P < 0.05$) in total fibre number (90,000 vs 110,000), but also a decrease ($P < 0.05$) in ST weight (.50 vs .65), compared to control. These results suggest that even within the same strain there are different mechanisms of growth that can be employed, depending on the growth conditions available. Application of 35.5°C produced a relatively more hyperplastic growth (increase in fibre number), while 38.5°C a more hypertrophic growth (increase in fibre cross-sectional area). From studies on other species, it is known that a greater fibre number is often associated with better growth, greater feed conversion efficiency, leaner meat and also better meat quality. These results could therefore have implications for these parameters in turkeys.

Key Words: Fibre number, Meat quality, Posthatch growth

1820 Effect of supplemental fat on growth performance and quality of beef from steers fed barley-potato product finishing diets II. Beef appearance, shelf-life, and palatability. D. J. Marks, J. R. Busboom*, M. L. Nelson, J. D. Cronrath, L. Falen, and P. S. Kuber, *Washington State University.*

The objective of this study was to evaluate the effects of supplemental fat in finishing diets on moisture properties, shelf life measurements, and palatability of beef. One hundred sixty-eight crossbred steers (318 2.8 kg) were allotted within weight block (3) to a randomized complete block design with a 2 x 3 + 1 factorial arrangement of dietary treatments. Main effects were level of yellow grease (0, 3, and 6%), and level of alfalfa hay (3.5 and 7%) with the added treatment of 6% tallow and 7% alfalfa hay in barley-based diets containing 15% potato by-product and 7% supplement fed for 165 d. Longissimus muscle cuts from four randomly selected steers per pen were used for determination of moisture retention properties, L*, a*, and b* color values using a Hunter Miniscan®, evaluation by a four person retail shelf-life panel and an eight member trained sensory panel (10 cm line scale). Diet did not affect ($P > 0.1$) pH (5.57 0.1) and wholesale purge (.5 0.1%). Shelf life measurements of color score, retail purge score, and L*, a* and b* values decreased with day ($P < 0.01$) with no dietary effects ($P > 0.1$). Diet did not affect drip (3 0.1%) or cook loss (28.8 2.5%). Initial tenderness was increased quadratically ($P < 0.10$) with yellow grease from 7.2 to 7.6 to 7.4 0.1, and decreased ($P < 0.10$) with alfalfa level in evaluation by the trained sensory panel. Diet did not affect initial juiciness (6.9 0.1), sustained juiciness (5.6 0.2), or beef flavor (5.3 0.1). There was an interaction of yellow grease by alfalfa detected for off flavor ($P < 0.05$), however all scores were less than 0.5 and were probably not biologically important. Supplemental fat did not affect most measurements of beef quality and palatability. However, supplemental fat increased initial tenderness for the sensory panel.

Key Words: Barley, Yellow Grease, Beef Palatability

1821 Effect of supplemental fat on growth performance and quality of beef from steers fed barley-potato product finishing diets III. Fatty acid composition of muscle and subcutaneous fat. D. J. Marks*, M. L. Nelson, J. R. Busboom, J. D. Cronrath, A. E. Koepp, and L. Falen, *Washington State University.*

One hundred sixty-eight crossbred steers (318 2.8 kg) were used to evaluate the effects of supplemental fat in finishing diets on fatty acid composition, including the c9,t11 isomer of conjugated linoleic acid (CLA) of longissimus muscle (LM) and subcutaneous fat. Animals were allotted within weight block (3) to a randomized complete block design with a 2

x 3 + 1 factorial arrangement of dietary treatments. Main effects were level of yellow grease (YG; 0, 3, and 6%), and level of alfalfa hay (3.5 and 7%) with the added treatment of 6% tallow (T) and 7% alfalfa hay in barley-based diets containing 15% potato by-product and 7% supplement fed for 165d. Fatty acids of LM and subcutaneous fat from four randomly selected steers per pen were quantified using gas chromatography after methylation with sodium methoxide. Dietary treatment did not affect total fatty acid (FA) content (DM basis) of LM (143 4.5 mg/g) or fat (958 9.3 mg/g). Palmitic acid decreased linearly ($P < 0.001$) with YG from 29.5 to 27.8 0.31 g/100g FA in fat. Stearic acid linearly increased ($P < 0.05$) with YG from 11.4 to 12.9 0.26 and from 10.0 to 12.0 0.34 g/100g FA in LM and fat, respectively, and oleic acid in fat from 42.1 to 43.5 0.44 g/100g FA. Steers fed 6% yellow grease compared to T had less ($P < 0.05$) stearic acid in LM (12.7 and 13.9 0.37 g/100g FA) and more oleic acid in fat (43.0 vs. 40.9 0.62 g/100g FA) and LM (42.7 vs. 40.3 0.53 g/100g FA). Level of yellow grease increased CLA quadratically ($P < 0.01$) in LM from 0.45 to 0.64 to 0.62 0.02 g/100g FA and fat from 0.61 to 0.835 to 0.825 0.02 g/100g FA. Conjugated linoleic acid was higher ($P < 0.1$) in LM (0.62 vs. 0.54 .04 g/100g FA) and also higher ($P < 0.05$) in fat (0.81 vs. 0.69 .04 g/100g FA) from steers fed yellow grease compared to T diets. Content of CLA in beef was increased without increasing total FA content by feeding yellow grease.

Key Words: Barley, Yellow Grease, CLA

1822 Market orientation: A possibility to improve consumers' acceptability of pork products. Charlotte Prestat* and M. Susan Brewer, *University of Illinois, Urbana-Champaign, IL.*

Pork producers have been confronted with increasing competition over the past few years, resulting in a renewed interest in developing food products with greater value added. However, since consumers are relatively closed to innovation, there is limited room for new product development. Understanding factors associated with purchase and consumption of pork will facilitate development of products and processes that promote pork utilization and increase market share. In this study, factors that may affect pork acceptability were evaluated by analyzing purchase and consumption behavior, as well as quality perception. A consumer survey (n=200) was conducted to qualitatively and quantitatively model the consumer choice process, to assess to what extent selected product characteristics impact consumers' quality evaluation and purchase intent, and to assess their weight relative to each other. Data were subjected to cluster analysis. Three clusters were separated. Cluster 1, representing 8.2% of the respondents, was primarily female (62.5%), over 40 years of age (68.8%). This group was concerned about health issues. The amount of visible fat accounted for 39% of the purchase decision while consumption acceptability depended essentially on the amount of fat in/on the product (51.5%). The second cluster (35.4% of the respondents) was primarily female (60.9%), between the ages of 18 and 40 (62.3%). The color (30%) and the amount of visible fat (21.5%) seemed to influence purchase intent for this cluster. Flavor and degree of doneness were equally important (27%) with respect to consumption acceptability. The third cluster (56.4% of the respondents) was primarily male (54.5%) between the ages of 18 and 55 (90%). Price was the most important factor (32%) during purchase, while sensory characteristics appeared to determine the experienced quality (flavor, 27.5%; tenderness, 22%; and juiciness, 18%). As the third cluster represents the majority of the respondents, particular attention should be paid to their behavior. These results suggest that enhancement of the sensory attributes of pork products along with a reduction of costs should be the priority of the pork industry.

Key Words: Pork product, Marketing Orientation, Consumer Purchase and Consumption Behavior

1823 Combined effects of pH and temperature on myoglobin in a model system. Liugen Zhu* and Susan Brewer, *University of Illinois at Urbana-Champaign.*

To understand the basic mechanism of the PSE phenomenon with respect to color abnormalities, the contributions of sarcoplasmic and myofibrillar protein denaturation under the combined influences of high temperature and low pH is of utmost importance. From a series of experiments heating metmyoglobin solutions at pH 5.0, 5.3, 5.6, 6.0, 6.5 and 7.0, the effects of temperature and pH on thermal stability of metmyoglobin were investigated. The percentage metmyoglobin denatured at temperatures from 25 to 80°C was determined. pHs lower than 6.5 caused metmyoglobin denaturation at various temperatures from 25 to 80°C, but was particularly apparent when pH < 5.6. Metmyoglobin denaturation did not occur until 60°C at pHs from 5.3 to 7.0. It occurred at 55°C at pH 5. Thermal stability of metmyoglobin increased as pH increased. A slow heating rate (0.9°C/min) caused more thermal metmyoglobin denaturation than a fast heating rate (1.3°C/min) when the temperature was above 55 to 60°C. The denaturation caused by low pH alone was reversible, while that caused by high temperature was not.

Key Words: myoglobin, PSE pork, protein denaturation

1824 Development of photographing equipment for the cross section of carcass and prediction of Beef Color Standard number by using obtained image from that equipment. K. Kuchida*, M. Hasegawa, M. Suzuki, and S. Miyoshi, *Obihiro University of AVM, Obihiro-shi Japan.*

The first aim of this study was to develop photographing equipment, which is able to take a clear image of the cross section of carcass integrating the digital camera and the illumination device. The second aim was to predict the Japanese Beef Color Standard (BCS) number by using the obtained image from that equipment. BCS is the standard model and consists of 7 ranks for the shade of meat color. The photographing equipment was composed of a dome section, the ring illumination section, and a digital camera section. 570 white LEDs (Light Emitting Diode) were arranged upward at the bottom of the dome section like a ring, and 432 white LEDs were arranged in a downward direction on the ring illumination section. The bottom of the dome section contacted with the cross section of carcass, so that photographing from a perpendicular direction and a constant distance was possible. Images around the ribeye at 6th-7th rib cross-section were collected (n=1,208) at a meat processing plant in Hokkaido, Japan. BCS number assigned by grader was predicted by multiple regression analysis using image analysis traits. Digital images of 1,208 carcasses were taken by this equipment. As no sample with diffused reflection existed on the surface of the ribeye, clear and stable images were effectively taken by using this equipment. The correlation coefficients of R, G, B components and luminance from image with BCS number of the standard model of BCS were -0.98, -0.91, -0.82, and -0.99, respectively. These results indicated that the relationship between luminance and BCS number of standard model had highly linearity. However, the correlation coefficients between luminance and BCS number of actual carcass (n=1,208) were lower (r=-0.66) than that of the BCS standard model. Multiple regression equation with the BCS number assigned by grader as the dependent variable were obtained by a stepwise method starting with 108 independent covariates for image analysis traits. BCS number was predicted by using the multiple regression with five covariates selected by the stepwise method. The percentages of the difference between the assigned BMS and the predicted BMS being ± 0 and within ± 1 were 76.8% and 100.0%, respectively.

Key Words: Meat color, Digital image, Image analysis

1825 Effect of high oil corn and vitamin E supplementation on ground beef case-life properties. M.S. Eibs*, B.J. Johnson, D.M. Wulf, B.C. Shanks, and T.A. Wittig, *South Dakota State University.*

The objective of this experiment was to investigate the effects of high oil corn and vitamin E supplementation on ground beef case-life properties. Steers (n = 84) were fed a high concentrate diet consisting of either typical corn (**C**: 79.5% of ration) or high oil corn (**HOC**: 79.5% of ration) for 112 days with (**+E**) or without (**-E**) vitamin E supplementation during the last 50 d (1,000 IU/hd/d). Steaks were removed 24 h postmortem from the 12th rib and trimmed. Steak trimmings were ground and formed into patties for retail display panel (**RDP**), thiobarbituric reactive substances determination (**TBARS**), and tocopherol analysis. Two storage treatments were used prior to RDP: 1) domestic chilled (**DC**), chilled storage for 13 d postmortem; and 2) export chilled (**EC**) chilled storage for 34 d postmortem. Patties were monitored for 9 d (d 0 to 8) under simulated retail meat display conditions by a 5-member panel and color was measured with a Minolta colorimeter. On d 8, TBARS of RDP samples were quantified. HOC grain contained greater ($P < 0.05$) α- and γ-tocopherol levels than C grain (14.62 and 84.90 vs 8.01 and 41.68 ppm). Ground beef concentrations of α- and γ-tocopherol were higher ($P < 0.05$) in HOC+E as compared to HOC-E, C+E, and C-E. Rate of discoloration, as appraised by RDP, was slower ($P < 0.05$)

for patties from HOC+E as compared to HOC-E, C+E, and C-E for EC storage treatment. Export chilled HOC+E patties maintained higher (P <0.05) a* values from d 2 to 8 when compared to HOC-E, C+E, and C-E. Patties from DC storage treatment with +E had lower (P <0.01) TBARS than -E patties. For EC ground beef, the reduction in TBARS for HOC+E vs HOC-E was twice the magnitude of the TBARS reduction for C+E vs C-E (corn type by vitamin E interaction, P <0.05), indicating +E had greater effects on TBARS for HOC fed cattle than for C fed cattle. These data suggest that the supplementation of vitamin E while feeding high oil corn to finishing beef steers elevates tocopherol levels in ground beef and slows the rate of discoloration.

Key Words: High Oil Corn, Tocopherol, Ground Beef

1826 Increased calcineurin activity is associated with muscle hypertrophy in callypyge sheep. C. E. Carpenter* and N. E. Cockett, *Utah State University*.

Calcineurin (Cn; protein phosphatase 2B) is a calcium-activated phosphatase that provides central downstream signals regulating muscle growth and development. Presently, Cn is understood to play a central role in muscle hypertrophy and expansion of the slow fiber population in chronically overloaded muscle. It is known that muscle hypertrophy and increased predominance of fast fibers occur in the longissimus, but not the supraspinatus, of callipyge sheep after they reach about 5 weeks of age. We tested whether altered Cn activity accompanied these effects. Calcineurin activity was determined in muscle extracts of the hypertrophy-responsive longissimus dorsi (LD) and hypertrophy-nonresponsive supraspinatus (SS) from 2-week-old and 8-week-old lambs of the callipyge and normal genotype. Muscle type, age, and genotype had an interactive effect (P < 0.05) on Cn activity suggesting that the callipyge gene exerts its effects in muscle via Cn-mediated pathways. Calcineurin activity was greater (P < 0.06) in the hypertrophy responsive LD from 8-wk-old callipyge (1.6 x 10^{-3} units activity per gram protein) as compared to 8-wk-old normal lambs (1.2 x 10^{-3}) or 2-wk-old callipyge lambs (1.3 x 10^{-3}). There were no differences for similar comparisons of Cn activity in extracts of SS. These observations suggests an active role of Cn in mediating the hypertrophy and shift towards the fast phenotype that occurs in the LD of callipyge lambs. The callipyge model of muscle hypertrophy may provide a unique model to study Cn-mediated signaling in skeletal muscle.

Key Words: Callipyge, Calcineurin, Skeletal muscle

1827 Diets containing conventional corn, conventional corn and choice white grease, high oil corn, or high oleic, high oil corn will influence the fatty acid profile of fresh pork adipose tissue. C. A. Stahl*[1], M. L. Linville[1], K. R. Maddock[1], T. E. Sauber[2], G.L. Allee[1], and E. P. Berg[1], [1]*University of Missouri, Columbia, MO,* [2]*DuPont Specialty Grains, Des Moines, IA.*

The objective of this study was to evaluate the effect of corn type on the fatty acid profile of six distinct fat depots within the pork carcass. Gene Packer X EB barrows (n = 196, 26.6 kg) were blocked by weight and randomly allotted 28 pens (7 replications per pen). Each treatment group had ad libitum access to one of four corn-based diets consisting of conventional corn (CONV), conventional corn supplemented with choice white grease (CWG), high oil corn (HOC) or high oleic, high oil corn (HOHOC). Following 98d on test, two animals per pen (n = 56) representing the average pen weight (118 kg) were selected for harvest. A single slice (cranial) of the fresh belly, belly leaf fat, ham seam (star) fat, ham inner and outer subcutaneous (s.c.) fat layers, and loin inner and outer s.c. fat layers were collected at 24h postmortem. Individual samples were packaged and frozen for subsequent fatty acid profile analysis. The saturated fatty acids palmitic (C16:0) and stearic (C18:0) were higher (P < .05) in the CONV treatment. Furthermore, the CONV treatment possessed the lowest percentage of unsaturated fat in all six fat depots (P < .05). CWG exhibited the highest percentage (P < .05) of conjugated linoleic acid in fresh belly slices, belly leaf fat, ham seam and inner s.c. fats, and loin inner s.c. fat. HOC treated animals possessed the highest percentage (P < .05) of linoleic (C18:2cis) acid. Total unsaturated and polyunsaturated fatty acids expressed as a percent of total lipid were highest (P < .05) in the HOC treatment. Differences (P < .05) were found in the percentage of monounsaturated fatty acids within the HOHOC diet, with the concentration of oleic (C18:1cis) acid greatest (P < .05) in all six fat depots. In conclusion, the level of saturated and unsaturated fatty acids within corn-based diets significantly affects the fatty acid profile of fresh pork adipose tissue.

Key Words: fatty acid, oleic acid, pork

1828 Genetic line effects on palatability, color and physical characteristics of fresh pork loin chops. J. M. Schlickau*[1], M. S. Brewer[1], A. Sosnicki[2], B. Field[2], and F.K. McKeith[1], [1]*University of Illinois,* [2]*PIC.*

The objective of this study was to characterize the sensory attributes, color and physical characteristics of pork from pigs of the following backgrounds: Duroc, Pietrain (Halothane negative, NN), Pietrain (Halothane positive, nn), Berkshire, Hampshire (rn), Hampshire (RN-), and a synthetic line. A trained panel evaluated visual appearance of uncooked lean and fat, and flavor and texture of cooked chops. L*, a*, and b* values, hue angle, cookloss and Warner-Bratzler shear force also were determined. Chops from Hampshire rn carcasses appeared more pink that those from Hampshire RN- carcasses. Chops from Duroc, Berkshire, Pietrain-nn, and the synthetic line had the lowest pink color intensity and were a minimum of 4 scale units lower than chops from Hampshire-rn carcasses. Chops from Berkshire carcasses appeared most marbled in the lean followed by those from Hampshires; chops from the synthetic line and from Pietrain-nn pigs appeared least marbled. Chops from Pietrain-nn and Hampshire-rn carcasses had the highest a* values; chops from Duroc, Pietrain-NN, and Hampshire-RN- carcasses had the lowest. Cook loss from chops from Duroc carcasses was lower than that from Hampshire, Pietrain-NN and synthetic line carcasses. The total cook loss range was 2.5% which could have significant economic implications. Warner-Bratzler shear force was highest for chops from Pietrain-nn and Hampshire-rn carcasses. Chops from Hampshire-RN- carcasses were most juicy followed by those from Hampshire-rn, Pietrain-NN, Berkshire and Duroc carcasses. Warner-Bratzler shear force was positively correlated with abnormal flavor intensity, metallic taste, and chewiness (r = 0.72, 0.94, and 0.69, respectively), and negatively correlated with sweetness (r = -0.73). As shear force increased, off flavors, metallic flavors and chewiness increased while sweetness decreased suggesting that genetic background may have some indirect impact on flavor. Overall, genetic background had significant effects on many of the quality characteristics evaluated, however, no one genetic background resulted in high scores in all, or even most, traits. This indicates that different genetic lines have different quality attributes to contribute.

Key Words: genetic lines, cook loss, color

1829 Effect of enhancement of beef rounds on sensory and retail display characteristics. K.L. Robbins* and M.S. Brewer, *University of Illinois, Urbana-Champaign, IL*.

Beef round roasts from USDA Choice and Select beef carcasses were used to evaluate the potential for enhancing sensory and retail display characteristics by injecting a solution of sodium chloride and phosphate. Paired sides were fabricated and the semimembranosus was removed from each side. The right and left sides were randomly assigned to control or injected treatments (0.4% sodium chloride 0.4% phosphate solution pumped to 110% raw weight). Muscles were pumped at day 14 - 21 postmortem. Following equilibration (5 - 10 d), steaks from each section were sliced to 2.5 cm and used for either sensory evaluation or overwrapped and displayed in a coffin style display case at 4C for up to 6 days. Samples for sensory evaluation and Warner Bratzler shear were cooked to 72C in electric skillets. Data were analyzed using a paired-T procedure. The trained panel determined that the enhanced steaks were significantly (P<0.05) more juicy and salty than the control steaks; however, tenderness and Warner Bratzler shear values did not differ. Enhancement had a detrimental effect on the color scores of the round steaks over display time. After two days in display, the enhanced steaks had significantly (P<0.05) lower visual color scores indicating darkening and discoloration. By day 4, a* and b* values were significantly lower for the enhanced steaks indicating they were less red and yellow. The aerobic plate counts (APC) suggested that enhanced steaks were slightly more susceptible to microbiological growth during retail display; however, the difference was not significant. Further work is continuing to evaluate enhancement of lower quality grades of beef at

various times postmortem to improve sensory and retail display characteristics and to increase beef consistency and consumer acceptability.

Key Words: Beef, Enhancement, shelf life

1830 Effect of breed-type on the performance and carcass traits of hair-sheep. J. K. Apple[1], J. M. Burke[2], W. J. Roberts[1], J. S. Stephenson[1], and L. K. Rakes[1], [1]*University of Arkansas,* [2]*USDA-ARS Small Farms Research Center, Booneville, AR.*

Live animal performance and carcass characteristics were measured for purebred Katahdin (K; n=15) and St. Croix (SC; n=8) lambs, as well as three-quarter St. Croix (SCX; n=8), Dorper × Romanov × St. Croix (DX; n=9), and Dorper × St. Croix (DXSC; n=7) lambs. After weaning, lambs were allowed 4 weeks to acclimate to a high concentrate finishing diet, which was fed for 120 to 127 d. Lambs were then transported to the University of Arkansas Red Meat Abattoir for harvest. At harvest, K, SC, SCX, DX and DXSC weighed 44.8, 43.7, 42.8, 49.6 and 56.4 kg, respectively. Carcass quality and cutability data were collected after a 7-d aging period at 2 C. From birth to weaning, K and DXSC lambs had higher (P<0.01) ADG than SC and SCX lambs; however, from weaning to harvest, DXSC had the highest (P<0.01) ADG, followed by DX, SC, SCX and K (253.7, 226.1, 204.9, 193.1 and 181.1 g/d, respectively). Carcasses from DXSC lambs were heavier (P<0.01) than all other breed-types; whereas, carcasses from K, SCX, DXSC and DX had greater (P<0.01) actual and adjusted fat thickness measurements, and resulting yield grades, than SC. Although fatter, carcasses from DXSC lambs had the largest (P<0.01), and SC and SCX lambs the smallest (P<0.01) longissimus muscle (LM) areas. Although kidney fat weights were similar (P>0.72), carcasses from SCX lambs tended (P<0.08) to have a higher percentage of internal fat than DX, DXSC and K lambs. Skeletal, lean and overall maturities were not different (P>0.26) among the breed-types; conversely, carcasses from SC lambs had lower (P<0.05) flank streaking scores than SCX, DXSC and K, with DX carcasses receiving intermediate scores. Conformation scores for DX and DXSC carcasses were substantially higher (P<0.01), resulting in higher (P<0.01) quality grades, than SC and SCX carcasses. Although L* values of the LM were similar (P>0.84), the LM from DX lambs was redder (P<0.01) and more yellow (P<0.01) than SC and DXSC. Results from this study indicate that improvements in ADG and carcass muscularity and quality can be achieved by using Dorper sires on purebred and crossbred St. Croix dams.

Key Words: Hair-sheep, Carcass quality, Cutability

1831 Relationship between porcine longissimus dorsi pH decline and μ-calpain activity/autolysis and protein degradation. L.J. Rowe, S.M. Lonergan, M.F. Rothschild, and E. Huff-Lonergan*, *Iowa State University, Ames, IA.*

Degradation of muscle proteins by μ-calpain has been hypothesized to affect meat tenderness and water-holding capacity. The rate and extent of pH decline in postmortem (PM) muscle tissue may affect μ-calpain activity and subsequently the rate and extent of muscle protein degradation. The objective of this study was to determine the relationship between PM muscle pH decline, μ-calpain autolysis and muscle protein degradation in pork. To achieve these objectives, 10 market weight pigs were harvested. The pH measures of the longisismus dorsi (LD) were taken at the last rib at 2 h and 24 h PM. Samples of the LD were taken at 2 h, 24 h, 72 h, 5 d, and 7 d PM. The LD samples were extracted in 5 vol of 50 mM HEPES, pH 7.6, 150 mM NaCl, 10% glycerol, 0.1% Triton X-100, 5 mM EDTA, 2 mM PMSF. After centrifugation, a portion of each supernatant was used for casein zymography to obtain a relative comparison of μ-calpain activity. The remainder of the supernatants and the pellets were used for immunoblotting with antibodies against μ-calpain 80-kDa subunit, desmin and troponin-T. Casein zymography revealed that a majority of the samples lost detectable μ-calpain activity between 24 and 72 h PM. Samples with the lowest pH at 2 h PM lost μ-calpain activity in the supernatant earlier than samples that had slower, limited pH decline. Immunoblotting of supernatants from all 2 h PM samples showed that the 80-kDa subunit of μ-calpain was intact. The 80-kDa subunit of μ-calpain was at least partially autolyzed in all samples by 24 h PM. Samples with higher pH values at 2 h and 24 h PM had the least extensive autolysis of the μ-calpain 80-kDa subunit in the supernatant 24 h PM. In all samples the 80-kDa subunit of μ-calpain was completely autolyzed by 72 h PM. Samples that had more extensive autolysis of μ-calpain at 24 h PM had earlier degradation of troponin-T and desmin compared to samples that had less extensive autolysis of μ-calpain at 24 h PM. These data indicate that rate and extent of pH decline may affect autolysis and activity of μ-calpain.

Key Words: μ-Calpain, Pork, pH

1832 Potassium Lactate and Sodium Diacetate Affects on the Microbial, Sensory, Color and Chemical Characteristics of Vacuum-Packaged Beef Top Loin Steaks. T. A. Williams*, R. K. Miller, N. Anwar, L. M. Lucia, and G. R. Acuff, *Texas A&M University, College Station, TX.*

Non-meat ingredients to enhance shelf-life, visual attributes and sensory characteristics of steaks is of high interest in the beef industry. The objective of this study was to examine the effects of injected potassium lactate and sodium diacetate on shelf life, tenderness, taste and color of top loin steaks. Beef strip loins (n = 48) were assigned to eight treatments: controls (non-injected and injected with water and sodium tripolyphosphate), potassium lactate (1.5, 2.0, and 2.5%), sodium diacetate (0.1%), and combinations of the two (1.5 /0.1 and 2.0/0.1%). After injection (110% of raw weight), top loin steaks were vacuum-packaged and evaluated for aerobic plate count **(APC)**, Minolta color space values, trained meat descriptive attribute panel color evaluation, 2-thiobarbituric acid values **(TBA)**, pH, purge (%), cook yield (%), Warner-Bratzler shear force (kg), and trained meat descriptive attribute sensory evaluation after 0, 7, 14, 21, 28, 35, 42, and 49 days of vacuum-package storage at 4C. Addition of sodium diacetate either alone or in combination with potassium lactate was effective in lowering APC for up to 49 days ($P < 0.05$). Potassium lactate increased pH ($P < 0.01$) and cook yield ($P < 0.01$), and decreased purge ($P < 0.05$) and shear force values ($P < 0.01$). Steaks injected with potassium lactate were darker ($P < 0.01$), but color brightened when potassium lactate was used in combination with sodium diacetate. Steaks injected with either potassium lactate and/or sodium diacetate had more two-toned color ($P < 0.01$) than unpackaged controls. Potassium lactate improved muscle fiber tenderness ($P < 0.01$), connective tissue amount ($P < 0.01$), and overall tenderness ($P < 0.01$) as determined from trained meat descriptive attribute sensory evaluation. Sensory data showed that steaks injected with potassium lactate had more soda ($P < 0.01$), chemical flavor aromatics ($P < 0.01$), salt ($P < 0.05$), bitter tastes ($P < 0.05$), and soapy aftertaste ($P < 0.01$) compared to controls. To increase shelf life of vacuum-packaged beef top loin steaks at 4C, 2.0% potassium lactate with 0.1% sodium diacetate is recommended; however, two-toned color and off-flavor may result.

Key Words: Beef, Potassium lactate, Sodium diacetate

1833 The influence of diets containing conventional corn, conventional corn and choice white grease, high oil corn, or high oleic, high oil corn on belly/bacon quality. G. Rentfrow*[1], K.R. Maddock[1], C.A. Stahl[1], M.L. Linville[1], T.E. Sauber[2], G.L. Allee[1], and E.P. Berg[1], [1]*University of Missouri,* [2]*Dupont Specialty Grains.*

The objective of this study was to evaluate the effect of corn type on belly firmness and bacon slicing yields. Crossbred barrows (n=196; 26.6 kg) were given ad libitum access to one of four corn-based diets consisting of conventional corn (CONV), CONV with choice white grease (CWG), high oil corn (HOC), or high oleic, high oil corn (HOHOC). Following 98 d on test, two animals representing the average pen weight (118 kg) were selected for harvest (n=56). Bellies were removed according to IMPS 408 specifications. Lateral and vertical flex tests were performed to determine the firmness of each belly. A higher lateral and a lower vertical flex indicated a firmer belly. Bellies were weighed prior to pumping and pumped to a target of 12% retention at a commercial packing plant. After pumping, bellies were re-weighed for actual pumping percentage, and cooked according to commercial protocol. Bacon slabs were pressed then sliced by a high-speed slicer at nine slices per 2.5-cm. Incomplete slices were removed from each end and weighed for determination of slicing yield. Each slab was divided into five equal sections. The first two slices from each section were used for fracture analysis and cooking evaluation, respectively. Bacon slices were cooked on a belt cooker targeting 40% of the original weight. Weight and length were determined on each slice before and after cooking to calculate cooking loss and shrink. No differences were observed between LSMEANS

across treatment for percentage pump retention, smokehouse yield, slicing yield, or slicing fractures (P>0.05). Also, no differences were observed for cooking loss or length of shrink. The CONV had the lowest vertical and the highest lateral flex, while the HOC possessed the highest vertical and the lowest lateral flex. Based on the results of this study, corn type influences belly flex but does not affect pump retention, slicing yields, or slicing fractures

Key Words: Bacon, Corn-type

1834 The effect of early weaning and intensive feeding on meat quality of beef cattle. PE Strydom* and EM Buys, *Animal Nutrition and Products Institute of the Agricultural Research Council*.

Twenty crossbred steer calves selected from the Sams Tender Beef Program®(STB) were compared to 20 conventionally raised steers (C). STB involves weaning at three months of age (instead of seven months or more), feedlot feeding for approximately 150 days (compared to 100 days conventional). Both groups were implanted with an anabolic growth promoter, fed a commercial feedlot diet and were slaughtered at the same carcass fat condition. The *M. longissimus* (LT) and *M. semitendinosus* (eye of silverside)(ST) of both sides of the carcass were sampled and aged for either 12 or 21 days and evaluated for sensory meat quality and shear force resistance. In addition, discoloration (metmyoglobin) of steaks displayed at 4 °C for a period of 4 days were measured for loins aged for 1, 12 and 21 days (0 - 2 °C). The STB procedure had a significant effect (P<0.05) on tenderness related characteristics of the LT and ST at both aging periods (Table 1). The effect of the STB procedure was less for the LT than for the ST muscle. The advantage of STB was emphasized by the fact that sensory tenderness scores tended to be higher for STB meat aged for 12 days compared to C meat aged for 21 days for both muscles. Prolonged aging (21 days) tended to reduce the advantage of STB over C. Although the STB treatment tended to discolor at a faster rate during retail display than C, neither treatment nor aging period had a significant effect on color shelf life (metmyoglobin accumulation). Furthermore, both treatments had metmyoglobin levels of < 14% after 4 days; well below the threshold level for consumer discrimination of 35%.

	Sams Tender Beef		Conventional		SEM∗
Aging period	12 days	21 days	12 days	21 days	
First bite tenderness†	6.40^{bc}	6.64^{c}	5.46^{a}	6.03^{b}	0.119
Overall tenderness	6.53^{bc}	6.72^{c}	5.56^{a}	6.09^{b}	0.118
Residual connective tissue	6.24^{bc}	6.37^{c}	5.61^{a}	5.92^{ab}	0.090
Shear force Resistance (Newton)	87.2^{bc}	78.6^{c}	106.8^{a}	92.7^{b}	2.70

^{abc} Means for each characteristic with different letters differ significantly (P<0.05) ∗ Standard error of mean † Worst for score 1, best for score 8

Key Words: Beef, Tenderness, Color shelf life

1835 The effect of dietary supplemental vitamin E and C on odors and color changes in irradiated pork. S. Ohene-Adjei*, T. Bertol, Y. Hyun, M. Ellis, S. Brewer, and F. K. McKeith, *University of Illinois at Urbana-Champaign.*.

Pigs (n=8/dietary treatment), were fed 4 dietary treatments: a control (CD, vitamin E- 26mg/kg feed), vitamin E (vitE-200mg/kg feed), vitamin C (vitC-500mg/kg feed), or vitamin E and C (vitEC-200 and 500mg/kg feed respectively) diet. The vitE was fed for 6 wk and vitC for 5 d. The pigs were harvested and loin (LD) and ground pork (Gr) samples were prepared in duplicates. Paired samples from the sides of individual pigs were randomly assigned to irradiation (IR) (4.5 kGy) or no irradiation (NIR) treatment to evaluate the effect of the dietary antioxidants on post-IR odor, color, and lipid oxidation. Treated LD and Gr samples were PVC-overwrapped and held in display (4°C) for 8 (Gr) and 9d (LD) to evaluate the shelf life characteristics. Color (L*, a*, and b*) and TBARS were evaluated at 0, 2, 4, and 8 for Gr and 0, 3, 6, and 9 d after overwrap for LD. Discoloration (%) of the irradiated LD was not different across dietary treatment until after 6 d. Odor intensity worsened with irradiation. Increasing storage time resulted in darker (L*), less red (a*) samples regardless of treatment. In the LD, change in L*, a* and b* were higher in the IR than the NIR. Also, yellowness (b*) decreased over time but was generally higher in the NIR than IR. In the Gr, % discoloration and odor intensity were (P<0.001) higher in IR than NIR. Gr-IR was darker (L*) compared to NIR. The NIR became less red with time (a*), and IR resulted in less yellow (b*). In the ground samples TBARS were significantly higher in the IR (4.2) than in the NIR (0.9) after 2 d storage. Compared to CD-IR treatment, vitE-IR resulted in lower TBARS by 4 d. Increased TBARS occurred in vitC -IR (9.71) compared CD-IR (5.1) by 4 d. The results suggest that irradiation resulted in color and odor changes; vitE reduced TBARS while vitC increased the TBARS compared to the CD-IR treatment.

Key Words: Vitamin E, Vitamin C, Irradiation

1836 Effect of the addition of electrolytes in drinking water and the chilling temperature on technological, physicochemical, and microbiological characteristics of pork. A. Alarcon-Rojo, S. Mendoza*, and A. Grado, *Universidad Autonoma de Chihuahua. Chihuahua, Chih. Mexico*.

With the objective of determining the effect of the addition of electrolytes in pig drinking water during resting and the effect of chilling temperature on technological, physicochemical and microbiological characteristics of pork, two experiment were carried out using 280 pigs from a technified farm of the central region of Mexico. The objective of experiment 1 was to evaluate the effect of electrolytes on meat quality. 80 pigs were offered electrolyte-containing water as the only drinking source during resting time, whereas the other 80 pigs were reared conventionally with only water as a drinking source. The objective of experiment 2 was to evaluate the effect of chilled carcass internal temperature (10 and 12 C) on meat quality, and the design consisted of two groups of 60 animals held at each temperature. The addition of electrolytes did not significantly (P>.05) affect drip loss, water holding capacity, carcass and leg yield, pH and temperature at 24 h post mortem, but improved (P<.05) meat color (L* = 39.74 0.42, a* = 2.82 0.19, and b* = 11.59 0.19 for the treated group versus L* = 42.40 0.42, a* = 2.26 0.19 and b* = 10.36 0.19 for the control group), increased pH at 45 min post mortem (6.53 0.02 versus 6.45 0.02), decreased temperature at 45 min post mortem (34.95 0.05 versus 35.69 0.05 C) and decreased electrical conductivity at 45 min (4.45 0.08 versus 5.23 0.08 mS/cm) and at 24 h post mortem (5.06 0.09 vs. 5.85 0.09 mS/cm). Carcasses with 10 C chilled carcass internal temperature showed higher (P<.01) cold carcass yield (2.55 0.15 versus 1.84 0.15%) but boned leg yield, water holding capacity, color, pH, temperature, electrical conductivity and bacterial counts of meat were not affected (P>.05). It is concluded that the addition of electrolytes in pig drinking water during resting improves physicochemical characteristics of meat, whereas having a chilled carcass internal temperature of 10 C improves cold carcass yield.

Key Words: electrolyte, pork quality, chilling temperature

1837 Relationship between a measure of troponin-T degradation and beef tenderness. L. J. Rowe, E. Huff-Lonergan, G. H. Rouse, D. E. Wilson, and S. M. Lonergan*, *Iowa State University*.

Development of beef tenderness during postmortem aging is believed to be due to degradation of muscle proteins, which results in a decrease in structural integrity of myofibrils. Observations of proteolysis of troponin-T and subsequent production of a 30-kDa protein product during postmortem aging have been widely reported in the literature. The objective of the current study was to determine the relationship between Warner-Bratzler shear (WBS) values and the presence of the 30-kDa band using densitometry. Angus bull calves (n=128) were used to meet this objective. Samples (2.54 cm and 0.5 cm thick) were removed from the 12th rib region of the right side of each carcass. Steaks (2.54 cm) were sliced, vacuum packaged, aged for 14 d at 1 C and frozen until WBS analysis. Steaks were cooked to an internal temperature of 71C and cooled to room temperature. Six cores (1.25 cm) from each steak were used to determine WBS. The 0.5 cm sample was vacuum packaged, aged for 7 d at 1C and frozen. These samples were used to monitor protein degradation by immunoblotting using an anti-troponin-T antibody. An extract from a reference sample (beef loin aged 7 d) was used on each membrane to serve as a reference across blots. Relative intensity of the 30 kDa bands was determined using the Kodak 1D 2.0 software and a

digital camera (Kodak DC120; Eastman Kodak, Rochester, NY). A ratio (relative intensity of 30-kDa band in the sample/intensity of 30-kDa band in the reference) was used as a measure of proteolysis. Samples were classified to 5 groups based on detection of the 30-kDa band (0 = no proteolysis, 4 = most proteolysis). WBS at 14 d postmortem was significantly negatively correlated (-.433) with the relative intensity of the 30 kDa band present at 7 d postmortem. Samples that showed no proteolysis after 7 days had the highest WBS of any group ($P < 0.01$). Samples classified in group 4 had a lower WBS than groups 0, 1 and 2. The results indicate that measures of troponin-T degradation may be useful in identifying sources of variation in tenderness of beef.

Key Words: Beef , Tenderness, Troponin-T

1838 Use of color and near-infrared reflectance analysis to predict Warner-Bratzler beef longissimus tenderness. C.E. Realini*[1], T.D. Pringle[1], W.R. Windham[2], B.G. Lyon[2], S.K. Duckett[1], and K.R. Smith[1], [1]*The University of Georgia, Athens,* [2]*USDA-ARS, Russell Research Center, Athens.*

This research used Angus heifers (n=9) to determine the ability of muscle color and near infrared reflectance (NIR) to predict tenderness of longissimus lumborum steaks. Lipid content, Warner-Bratzler shear force (WBS), Hunter L*, a*, and b* values, and visible (VIS) and NIR spectra were measured after 2, 4, 8, 14, and 21 d of aging. Shear force values were higher ($P<0.01$) at 2 d than at all other aging times (5.9, 4.8, 4.7, 4.5, and 3.9 kg for 2, 4, 8, 14, and 21 d, respectively), and lower at 21 d ($P<0.01$) than at other aging times. Hunter L*, a*, and b* values increased with aging time indicating that steaks became lighter, redder and yellower during postmortem storage. Correlations of WBS with colorimeter data were higher than with lipid percent. Among the color measures, L* values had the highest correlations with WBS except at 2 d of aging. Day 2 L* values accounted for 28.0, 20.4, 4.0, 0.1, and 6.9% of the variation in WBS, while lipid percent accounted for 3.2, 0.6, 7.9, 8.2, and 15.2% at 2, 4, 8, 14, and 21 d, respectively. Partial least squares (PLS) regression was used to predict WBS from VIS and NIR spectra. Spectra from three regions (400-780 nm, VIS; 780-1850 nm, NIR; and 400-1850 nm, VIS/NIR) were used in PLS modeling of WBS. The SE of cross validation and R2 were 0.65 kg and 0.36, 0.71 kg and 0.37; and 0.57 kg and 0.52 for the VIS, NIR, and VIS/NIR regions, respectively. The first principal component (PC) from the VIS/NIR spectra indicated variation in WBS values was due primarily to absorption in the VIS region. Protein and fat absorption peaks at 1138 and 1390 nm, respectively, were present in the second factor, with no absorption peaks in the visible region. The third PC indicated absorption in the VIS region, and protein and fat in the NIR region. The first 3 PC explained 61% of the variation in WBS, and suggest that this prediction is based on information in both the VIS and NIR spectra. It is not clear whether the information in the VIS/NIR spectra was sufficient for practical meat tenderness prediction, and samples with larger variation in WBS are needed to more accurately define this relationship.

Key Words: Beef, Tenderness, Near-infrared

1839 Effect of conjugated linoleic acid supplementation on pork quality and fatty acid profiles. M.W. Greene*[1], T.D. Pringle[1], M.J. Azain[1], M.H. Gillis[1], S.K. Duckett[1], G.J. Hausman[2], and C.R. Barb[2], [1]*The University of Georgia, Athens,* [2]*USDA-ARS, Russell Research Center, Athens.*

This study was conducted to determine the effects of supplemental conjugated linoleic acid (CLA) on pork quality and fatty acid composition. Crossbred gilts (n=15) were fed a corn/soybean ration containing 0, 0.5 or 2.0% CLA and humanely harvested at the University of Georgia Meat Science and Technology Center. Backfat samples were removed immediately after slaughter for determination of fatty acid composition. Following a 24-h chill, carcasses were ribbed and carcass data, including visual color and marbling scores, were collected. Longissimus L*, a*, and b* values were recorded and samples were removed for lipid determination. CLA supplementation had no effect ($P>0.05$) on daily gain, feed intake or feed:gain. Tenth rib backfat (0.69, 0.60, and 0.63; SEM=0.55) and loin eye area (6.0, 5.8, and 5.3; SEM=0.3) were numerically lower in CLA treated pigs. Neither visual longissimus color scores nor Hunter L*, a*, and b* values differed across treatments. Marbling scores were numerically higher in the 2.0% CLA-treated pigs than the control and the 0.5% CLA-treated pigs (1.5 and 1.5 vs. 1.8; SEM=0.3); which was consistent with the longissimus lipid percentages across CLA treatments (2.8, 3.0, and 3.4; SEM=0.3). Fatty acid profiles showed that CLA percentage in the subcutaneous fat increased ($P<0.01$) as CLA in the ration increased (c9t11; 0.2, 0.6, and 1.6; SEM=0.1; t10c12; 0.1, 0.4, and 1.8; SEM=0.1). As expected, the percentage of saturated fatty acids in the backfat increased ($P<0.05$; 32.0, 33.7, and 37.7; SEM=1.3) and monounsaturated fatty acids decreased ($P<0.01$) as CLA concentration in the ration increased (42.7, 39.1, and 37.2; SEM=0.9). These changes were due primarily to incremental increases in the percentage of C18:0 and decreases in the percentage of C18:1 as dietary CLA increased. Dietary CLA supplementation significantly alters fatty acid composition; however, more research is needed to document significant compositional changes at the carcass level.

Key Words: CLA, Pork, Fatty Acids

1840 Perimysium structure and collagen content change with muscle type and myostatin inheritance. R Taylor*[1], R Labas[1], P Berge[1], and J Culioli[1], *Meat Research Station, INRA.*

Previous studies have shown that collagen content and heat stability change with muscle type and/or age. Less well charaterized is how changes in collagen are expressed structurally, as changes in perimysium. To investigate this we studied three different models in beef cattle which may have changes in collagen and perimysium. Comparison of muscle types *Pectoralis profundis* (Pp), *Gluteus biceps* (Gb) and *Semitendinosus* (St) showed that Pp has more perimysium, measured histologically as % muscle surface area and as length, than St and Gb. Qualitative evaluation showed that the form of the perimysium was clearly different in Pp compared to St and Gb, which were not different. As expected the collagen content and thermal properties varied with muscle type. In the second model myostatin -/- animals, with extensive muscle hypertrophy, were compared to normal animals, myostatin +/+. Myostatin -/- animals had less perimysium as % area and length, more soluble collagen and less total collagen (approx.-30%). In the third model *Semimembranosus* muscle was compared in cows from 2 contrasting breeds and production systems,i.e.Holstein (dairy) and Salers (meat, "rustic", raised in highlands), and finished in similar conditions. The hypothesis was that both breed and production system affect perimysium and collagen properties. However, no difference was found in perimysium distribution or collagen parameters comparing these breeds. We conclude that the major growth gene myostatin and muscle type, but not Holstein versus Salers breeds, have significant effects on perimysium organization.

ASAS Beef Species

1841 Pre-slaughter condition scoring of Zebu Cattle. O.T.F. Abanikannda*[1], A.O. Leigh[1], O.Y. Apena[1], and O. Olutogun[2], [1]*Department of Zoology, Lagos State University, Ojo - Lagos, Nigeria,* [2]*Department of Animal Science, University of Ibadan, Nigeria.*

Condition scoring provides a quick, cheap and easy method of assessing an individual animal brought to the abattoir for slaughter. In this study, nine scores were used in which the three main conditions: fat (F), medium (M) and lean (L) were further subdivided into three categories: F+, F, F-; M+, M, M-; L+, L and L-. Four-hundred, fifty-four cattle comprising 362 male and 92 female, 26 polled and 428 horned were evaluated. Of the three main categories, 54.85% were fat, 29.30% were medium and 15.85% were lean. However, the F+ had the highest frequency (40.16%) of the fat, the M+ had 64.66% of the medium while L- had the highest frequency (80.55%) of the lean. It is not surprising that over half of the cattle brought to the abattoir and lairage belong to the F class. This is because most of the cattle that are better priced are those that are visually appealing and which are expected to yield higher meat to bone ratio. Lagos, being of cosmopolitan nature, boasts the best or choice grade of cattle, despite the fact that these animals are