W67 Effects of fasting on serum insulin-like growth factor I and liver insulin-like growth factor I and growth hormone receptor mRNA in cattle . Y. Wang, S. Eleswarapu, W. E. Beal, W. S. Swecker, R. M. Akers, and H. Jiang*, *Virginia Polytechnic Institute & State University*.

Nutritional deprivation decreases blood insulin-like growth factor I (IGF-I) concentrations in a variety of species. In this study we tried to understand the underlying mechanism by determining the effects of fasting on the levels of total IGF-I and total GHR mRNA, as well as the levels of individual IGF-I and GHR mRNA variants in the liver of young steers. Fasting for nearly three days decreased the levels of serum IGF-I by 63% ($P < 0.01$) and this decrease was associated with a 75% decrease ($P < 0.01$) in total IGF-I mRNA in the liver. Fasting-induced decrease in liver IGF-I mRNA was further found to be caused by an equal decrease in the levels of both class 1 and class 2 IGF-I mRNA. In addition to IGF-I mRNA, fasting also decreased the levels of total GHR mRNA in the liver ($P < 0.05$) and this decrease was associated with a decrease in the levels of GHR mRNA variants 1C3 ($P < 0.05$) and 1A ($P = 0.08$). Fasting did not affect the levels of two other major GHR mRNA variants, 1B and 1C2. These results together suggest the following mechanism for fasting-induced decrease in blood IGF-I: fasting decreases the levels of GHR mRNA variants 1C3 and 1A in the liver, thereby decreasing GHR number, thereby decreasing GH-induced expression of IGF-I mRNA, thereby decreasing IGF-I secretion from the liver, and thereby decreasing blood IGF-I.

Key Words: Cattle, Insulin like growth factor, Liver

W68 The bovine growth hormone receptor promoter 1 is positively regulated by hepatocyte nuclear factor 4γ via the same element for hepatocyte nuclear factor 4α. H. Jiang*[1], M. C. Lucy[2], and Q. Xu[1], [1]*Virginia Polytechnic Institute & State University*, [2]*University of Missouri*.

Transcription of growth hormone receptor (GHR) gene is directed by multiple promoters. One promoter, named GHR P1, is responsible for liver- and postnatal stage-specific expression of the GHR mRNA variant 1A. We previously found that the region between nucleotide -218 and nucleotide -151 (relative to the transcription start site) of GHR P1 plays a role in regulating the promoter activity, through interactions with a transcription factor named hepatocyte nuclear factor 4α (HNF-4α). Deoxyribonuclease I footprint analyses and electrophoretic mobility shift assays indicated that the -218/-151 region might bind additional transcription factors in the liver. The objective of this study was to identify these additional transcription factors. Using the yeast-one hybrid system with the -218/-151 region as bait, we have isolated dozens of putative clones from a bovine liver cDNA library. Nucleotide sequencing identified several of the clones as hepatocyte nuclear factor 4γ (HNF-4γ) in addition to HNF-4α. Sequence analyses indicated that HNF-4γ and HNF-4α were encoded by different genes. Electrophoretic mobility shift assays revealed that HNF-4γ bound to the same element consisting of direct repeats of GGTCA between nucleotide -196 and nucleotide -178, to which HNF-4α had been found to bind. Ribonuclease protection assays indicated that like HNF-4α, HNF-4γ mRNA was highly expressed in liver, absent in most tissues, and more abundant in adult liver than in fetal liver. Co-transfection analyses demonstrated that HNF-4γ was able to enhance the GHR P1 activity in the presence or absence of HNF-4α and that this enhancement was dependent on the GGTCA repeats in the -196/-178 region. These results together suggest that HNF-4γ is another transcription factor for the liver- and postnatal stage-specific GHR P1, which positively regulate the GHR P1 activity via the same element for HNF-4α.

Key Words: Transcription factor, Growth hormone receptor, Liver

W69 Gender differences in serum insulin-like growth factor (IGF)-I and IGF binding proteins in eight exotic species. K.E. Govoni*, D. Goodman, R.M. Maclure, and S.A. Zinn, *University of Connecticut, Storrs, CT*.

The somatotropic axis is important in the regulation of growth. Increased concentrations of IGF-I and IGF binding protein (BP)-3 and decreased concentrations of IGFBP-2 are associated with increased growth rates in cattle and swine, however limited experiments have been done to examine the somatotropic axis in exotic species. The overall objective of this experiment was to determine serum concentrations of IGF-I, IGFBP-2 and IGFBP-3 in eight different exotic species. Serum samples were collected from male (M) and female (F) Java Banteng (5M; 3F), Bongo (5F; 3M), Addra Gazelle (4M; 4F), Giant Eland (6M; 2F), Nile Lechwe (5M; 3F), Roan Antelope (4M; 4F) and White Rhinoceros (4M; 4F). Blood samples were collected at two different time points, from each animal. At each time point, on average, F were older than M for all species except Nile Lechwe and White Rhinoceros. In addition, one sample was collected from eight (5M; 3F) Asian Elephants. Concentrations of IGF-I were determined by RIA and concentrations of IGFBP-3 and -2 were determined by Western Ligand Blot. Concentrations of IGF-I, IGFBP-3 and IGFBP-2 were detectable in all species. Average concentrations of IGF-I, IGFBP-3 and IGFBP-2, for all species, range from 17 to 442 ng/mL, 17 to 178 arbitrary units (AU) and 10 to 61 AU, respectively. In general, average concentrations of IGF-I and IGFBP-3 were greater in M and concentrations of IGFBP-2 were greater in F. Concentrations of IGF-I were greater in M than F ($P < 0.05$) in Java Banteng and in Nile Lechwe. There was a trend for greater concentrations in M than F ($P < 0.10$) in Bongo, Roan Antelope and White Rhinoceros. Concentrations of IGF-I increased with age in Java Banteng ($P = 0.08$) and in M Nile Lechwe ($P < 0.05$) and decreased in White Rhinoceros ($P = 0.07$) and F Nile Lechwe ($P < 0.05$). Concentrations of IGFBP-3 in Java Banteng were greater in M than F ($P < 0.01$) and increased with age ($P < 0.01$). Concentrations of IGFBP-2 were greater in F than M in Elephants ($P < 0.05$) and in Roan Antelope ($P = 0.08$). Although relatively few samples were collected, gender and age differences were observed, in some of the species, which parallel differences observed in domestic species.

Key Words: Insulin-like growth factor binding proteins, Insulin-like growth factor-I, Exotic species

Meat Science & Muscle Biology: Manipulation of Meat Quality

W70 Antioxidant effects of rosemary extract and whey powder on the oxidative stability of wiener sausages during 10 months frozen storage. S. A. Coronado[1], F. R. Dunshea[2], and N. P. Shah[1], [1]*Victoria University, Melbourne, Australia*, [2]*Victorian Institute of Animal Science, Werribee, Australia*.

Lipid oxidation is a major problem encountered in meat processing. Fishmeal is added directly to pig feed in order to provide protein or energy and to increase dietary vitamin A and D. However, high levels of fish oil render the animal fat more prone to oxidation while introducing fishy odors into the meat product. The aim of this study was to investigate the stability of wiener sausages prepared from pork obtained from pigs fed diets containing vitamin E (10 or 200 mg α-tocopheryl acetate per kg feed) and fish-meal (0 or 5%) and manufactured with or without an antioxidant (0.03% rosemary extract or 2.5% sweet whey). Twelve (Large White x Landrace) gilts were randomly allotted to four dietary treatments containing two levels of vitamin E (10 or 200 mg/kg) and two levels of fish meal (0 or 5%) using a 2 x 2 factorial design. Wiener sausages were manufactured from meat obtained from animals after slaughter and stored for 5 days at 4°C with or without antioxidants. The oxidative stability of the wieners was examined over ten months of frozen storage. Lipid oxidation in the product was measured by means of thiobarbituric acid reactive substances (TBARS) and fluorescence shift. Sensory evaluation of the product to detect oxidative changes was also carried out. No lipid oxidation as measured by TBARS, fluorescence shift and sensory analysis was observed in wieners stored at -20°C for ten months. The oxidative stability of wieners was unaffected ($P > 0.05$) by dietary treatments or by the addition of antioxidants. Dietary vitamin E lowered TBARS values and helped retard lipid oxidation.

Key Words: Antioxidant, Oxidation, Wiener

W71 Chemical composition and meat quality of pale, soft and exudative, and red, firm and non-exudative pork meat. F. Figueroa*[1], C. Perez[1], A. D. Alarcon[2], F. J. Solis[2], J. A. Jimenez[2], and G. Erosa[2], [1]*Universidad Autonoma de Baja California,* [2]*Universidad Autonoma de Chihuahua*.

The objective of this study was to evaluate the composition and meat quality of pale, soft and exudative (PSE) and red, firm and non-exudative (RFN) pork meat in twenty samples of Semimembranosus muscle (8 PSE and 12 RFN). The carcass measurements included weight of hot carcass with head (HCW), meat pH at 45 min (pH45) and at 24 h post mortem (pH24), the color coordinates L* (luminosity), a* (redness), and b* (yellowness) determined at 24 h post mortem. Measurements in meat included ash, organic matter (OM), water, dry matter (DM), crude protein (CP), water holding capacity (WHC), and free water (FW). PSE carcasses had similar HCW but lower pH45 that RFN, pH24 was similar in both types of meat. L* and b* were significantly (P<0.05) higher in PSE carcasses than RFN. There were no differences (P>0.05) in redness of meat. Water, DM, and CP contents were similar in both types of meat but PSE meat had higher ash and lower OM percentage. Both types of meat showed a negative correlation between water content and pH45, and between WHC and water content. WHC, L*, a*, and b* of PSE meat showed a negative correlation with pH45 while WHC of the same meat had a positive correlation with L*, a* and b*. A positive association between FW and pH45 of RFN meat was observed, as well as, between WHC and a*. It was concluded that PSE and RFN meat had similar chemical composition and meat quality except for ash content and meat yellowness which were higher in PSE meat.

Key Words: Meat quality, PSE pork meat, RFN pork meat

W72 SDS-PAGE profile of sarcoplasmic and myofibrillar proteins of pale, soft and exudative and red, firm and non exudative pork meat. F. Figueroa*[1], C. Perez[1], A. D. Alarcon[2], F. J. Solis[2], J. A. Jimenez[2], and G. Erosa[2], [1]*Universidad Autonoma de Baja California,* [2]*Universida Autonoma de Chihuahua*.

The objective of the study was to characterize the sarcoplasmic protein profile and myofibrillar components of pale, soft and exudative (PSE) and red, firm and non-exudative (RFN) pork meat. Three samples of Semitendinosus muscle from each type of meat were taken 24 h post mortem and analyzed by SDS-PAGE. Sarcoplasmic proteins recognized in both types of meat were phosphorylase, creatine kinase, enolase, α-glyceraldehyde phosphate dehydrogenase, phosphoglucomutase, pyruvate kinase, phosphoglycerate kinase, and a polypeptide of phosphofructokinase, and one of aldolase. The 84 and 27 kDa bands were observed only in RFN meat and attributed to phosphorilase-β-kinase and triase phosphate isomerase respectively. The myofibrillar proteins identified in both types of meat were a polypeptide of myosin, β-actinin, actin, and the ϵ-actinin. The proteins observed only in RFN meat were a polypeptide of α-actinin, a 58 kDa, and troponin I as well as two high molecular weight (MW) bands and four low MW components, whereas those found only in PSE meat were four low MW and two high MW non identify proteins. It was concluded that the main difference between PSE and normal or RFN meat are the 58 kDa myofibrillar component, as well as the 54 and 27 kDa sarcoplasimc protein found only in RFN meat, and the 73 and 33 kDa protein of PSE meat.

Key Words: PSE and RFN pork meat, Sarcoplasmic protein, Myofibrillar protein

W73 Structure and ultrastructure of pale, soft and exudative and red, firm and non-exudative pork meat. F. Figueroa*[1], C. Perez[1], A. D. Alarcon[2], F. J. Solis[2], J. A. Jimenez[2], and G. Erosa[2], [1]*Universidad Autonoma de Baja California,* [2]*Universida Autonoma de Chihuahua*.

Twelve samples of Semimembranosus muscle from pork were used to characterize the structure and ultrastructure of pale, soft and exudative (PSE) and red, firm, and non-exudative (RFN) pork meat. Observations from a scanning electron microscope showed that RFN fibers had a polygonal and straight shape with a lower interfibrillar and myofibrillar space than PSE fibers which showed an angular and flat shape with higher interfibrillar and myofibrillar space, and the absence of nuclei. Vast degradation of connective tissue was also observed in PSE meat. Differences between both types of meat were not clear when samples were examined under the optic Axiomat and the transmission electron microscopes. It was concluded that PSE meat has higher degradation of fibers, myofibrils and connective tissue than RFN muscle.

Key Words: PSE and RFN pork, Electron microscopy, Structure and ultrastructure

W74 Oxidative stability, shear force, and color of stored pork from pigs heterozygous for Rendement Napole and/or Halothane genes and consuming magnesium through drinking water. B. R. Frederick*, E. van Heugten, and M. T. See, *North Carolina State University, Raleigh, NC*.

Sixty-four pigs (117±0.7 kg BW) representing 1) non-carriers (NN/rn^+rn^+), 2) Rendement Napole carriers (NN/RN^-rn^+), 3) Halothane carriers (Nn/rn^+rn^+), and 4) carriers of both mutations (Nn/RN^-rn^+) in a factorial arrangement were individually penned and provided ad libitum access to feed (0.12% Mg) and water. Pigs were randomly allotted to receive 900 mg of Mg/L of drinking water from $MgSO_4$ for 0 or 2 d before harvest. Longissimus dorsi (LD) and Semimembranosus (SM) chops were placed on trays, wrapped, and stored at 4°C to simulate retail display for 8 d. The posterior LD was split, vacuum packed, and stored at 4°C for 25 or 45 d. The RN carriers, regardless of the Halothane gene ($N\_/RN^-rn^+$), had higher (P<0.05) initial lipid oxidation of SM (117 vs 98±3 μg malonadehyde (MDA)/kg of tissue), oxidation of LD and SM after 8 d of displayed storage (322 vs 159±14 and 399 vs 157±16 μg MDA/kg of tissue, respectively), LD Minolta L* (lightness) after 25 and 45 d of vacuum packed storage (61.6 vs 56.3±0.8 and 62.3 vs 56.7±0.7, respectively), LD Minolta a* (redness) after 25 d of vacuum packed storage (11.28 vs 10.06±0.15), and lower (P<0.05) LD shear force (3.05 vs 3.94±0.10 kg) than normal rn^+ pigs ($N\_/rn^+rn^+$). Halothane carriers, regardless of the RN gene ($Nn/rn^+\_$), had higher (P<0.05) LD Minolta L* after 25 d of vacuum packed storage (60.6 vs 57.3±0.8), cooking loss (29.3 vs 25.9±0.8%), and LD shear force (3.71 vs 3.28±0.10 kg) than Halothane normal ($NN/rn^+\_$) pigs. A genotype interaction was present for LD Minolta a* after 45 d of vacuum packed storage (9.81, 10.88, 9.64, and 12.95±0.3 for genotypes 1, 2, 3, and 4, respectively). Magnesium did not affect quality characteristics reported. However, the Napole mutation increased lipid oxidation of loin and ham muscles, tenderness of displayed loins and paleness and redness of vacuum packed loins. The Halothane mutation increased cooking loss and toughness of displayed and paleness of vacuum packed loins.

Key Words: Rendement Napole, Halothane, Magnesium

W75 The influence of dietary protein on market barrows and gilts supplemented creatine monohydrate in conjunction with a high glycemic carbohydrate. C. A. Stahl*[1], B. R. Wiegand[2], M. S. Carlson[1], D. L. McNamara[1], T. B. Schmidt[1], and E. P. Berg[1], [1]*University of Missouri, Columbia, MO,* [2]*Illinois State University, Normal, IL*.

Forty-eight Q-Max X Premier T-100 barrows and gilts (91 kg) were blocked by both weight and sex and assigned to one of 12 pens (four pigs/pen, 16 pigs/treatment) using a completely randomized design. Treatments 1 (basal diet consisting of a ground corn-soybean base) and 2 (basal diet supplemented with 0.92% creatine monohydrate (CMH) and 2.75% dextrose) were formulated to meet or exceed all NRC recommendations, while treatment 3 (basal diet supplemented with 0.92% CMH and 2.75% dextrose) was formulated to contain a minimum of 16% CP. All test diets were isocaloric and the CP ratio between barrows and gilts remained constant so that the synthetic levels of lysine were consistent within each treatment. Animal weight and feed disappearance was recorded at 7d intervals throughout the 28d testing duration to determine ADG and feed efficiency. In addition, real-time ultrasound was used to determine fat accretion and lean tissue development at the tenth rib. Upon completion of the growth study (d1-28), animals remained on experimental diets for an additional 5d to reach market weight. Treatment 3 barrows gained the least tenth rib fat (0.69; 0.43; 0.15; +/- 0.05cm; P<0.0001) and expressed the highest percentage fat free carcass lean (50.58; 52.22; 54.09; +/- 0.66%; P=0.001) after 28d on test. In addition, dietary treatment decreased the first (1.6; 1.7; 1.45 +/- 0.15cm; P=0.02), tenth (2.25; 2.03; 1.66 +/- 0.16cm; P=0.03) and last (2.50; 2.36; 1.75 +/- 0.20cm; P=0.02) rib fat depth of treatment 3 barrows after 33d supplementation. Conversely, no significant treatment differences were noted in the fat and lean tissue accretion of gilts. Moreover, diet did not significantly affect the meat quality parameters of barrow

and gilt carcasses measured at one and 21d postmortem. In conclusion, the data suggest that an increase in dietary CP significantly affects the body composition of barrows fed a combination of 0.92% CMH and 2.75% dextrose.

Key Words: Creatine, Lysine, Pigs

W76 Improving pork tenderness using hydrodynamic pressure. M. B. Solomon* and V. Pursel, *USDA-ARS, Beltsville, MD USA*.

Pork producers have implemented management strategies that have resulted in today's pork having less fat and more lean tissue which in turn have negatively influenced meat tenderness. The objective of this study was to determine whether hydrodynamic pressure processing (HDP) could improve pork tenderness. The longissimus (LM) muscles (left side) from 17 pork carcasses were excised within 1 h post-slaughter, vacuum packaged and aged (4 C) for 5 d then frozen (-10 C) for 3 months. A 15 cm frozen section (sirloin end) was removed from each LM and thawed (4 C) for 24 h. These sections were in turn divided in half and designated as anterior and posterior halves and randomly assigned to either HDP or control (C) treatment. HDP treatment consisted of a 1.3 cm thick flat steel plate fitted to the bottom of a 115-L plastic container filled with water. A 100 g of binary explosive was suspended 38 cm above the steel plate. Eight pork samples designated for HDP were vacuum packaged in one bag and placed on the steel plate and HDP treated. The remaining nine samples designated for HDP were vacuum packaged in one bag and placed on the steel plate and HDP treated. Two chops (2.5 cm thick each) were cut after HDP treatment from both the HDP treated and C sections for shear force evaluation. The HDP treatment consisting of eight samples improved 18.4% in shear force (C=7.08kg vs HDP=5.76kg). Percent improvement ranged from a low of -5.9% to a high of 35.3%. The HDP treatment consisting of nine samples improved 26.4% in shear force (C=7.51kg vs HDP=5.50kg). Percent improvement ranged from a low of 4.6% to a high of 46.1%. The combined average shear force improvement for HDP treatments was 22.6%. Results indicate that HDP enhances pork tenderness, however, a variability in meat sample response to HDP treatment exists.

Key Words: Pork, Tenderness, Hydrodynamic pressure

W77 Densitometric analysis of myofibrillar proteins in muscle samples from Angus bulls with high or low blood serum IGF-I concentration. A. Yilmaz[1], M. E. Davis*[1], R. C. M. Simmen[2], and M. Yamaguchi[3], [1]*Department of Animal Sciences, The Ohio State University,* [2]*Department of Animal Science, University of Florida,* [3]*Department of Veterinary Biosciences, The Ohio State University*.

The objective of this study was to determine possible changes in expression of myofibrillar proteins in muscle samples from bulls with high or low blood serum insulin-like growth factor I **(IGF-I)** concentration. Data were obtained from an experiment involving Angus beef cattle divergently selected on the basis of blood serum IGF-I concentration at the Eastern Ohio Resource Development Center. Selection was based on the mean IGF-I concentration of three blood samples taken at d 28, 42, and 56 of the 140-d postweaning test. Muscle samples were collected from carcasses of 43 bulls (21 high and 22 low line). Age at slaughter ranged from 374 to 443 d. Myofibrils were prepared using differential centrifugation and loaded on SDS-PAGE gels. Densities of each of the myofibrillar protein bands were determined using a laser scanning densitometer. Data were analyzed using SAS. All models used in this study included the fixed effect of year-line-season and the random effect of sire nested within year-line-season. Contrast analysis showed that a 35.2 32.1 ng/mL difference ($P < 0.28$) in mean IGF-I concentration of the high and low IGF-I line bulls did not result in line differences in density of the myofibrillar proteins, except that myosin light chain 2 was higher in low line than in high line bulls ($P < 0.05$) and troponin C density was higher in high line than in low line bulls ($P < 0.05$). Previous research, however, has shown that increasing amounts of troponin C loaded on a gel did not result in linear increases in the density of this molecule. A significant residual correlation between density of troponin T and IGF-I concentration measured at d 28 of the postweaning test was found (r = -0.44; $P = 0.05$). Significant cubic relationships of 32 kDa protein, myosin heavy chain, and alpha-actinin with mean IGF-I were detected. These results suggest that divergent selection for blood serum IGF-I concentration is not associated with changes in expression of most of the myofibrillar proteins, but some phenotypic relationships exist among these variables.

Key Words: Insulin-Like Growth Factor I, Myofibril, SDS-PAGE

W78 Effect of fish oil and/or canola oil supplementation to beef cattle fed finishing diets on animal performance, carcass quality, and fatty acid composition. M. H. Gillis*, S. K. Duckett, B. Jacob, K. R. Smith, and C. E Realini, *The University of Georgia, Athens*.

Twenty-four Angus x Hereford steers (387 kg) were used to determine the effect of fish oil and/or canola oil supplementation in a finishing diet on animal performance, meat quality and tissue fatty acid composition. Steers were randomly allotted to one of three diets: 1) basal high concentrate diet (NONE; 88% concentrate, 12% grass hay), 2) basal diet plus 4% canola oil (CA), or 3) basal diet plus 3% canola oil and 1% crude fish oil (FISHCA). All steers were implanted with Synovex-S at the initiation of the study and fed the basal diet (NONE) for the first 41 d. After 41 d on feed, animals were gradually switched to treatment diets over a two-week period. From d 56 to harvest (d 106), all steers received their appropriate treatment rations. At 24 h postmortem, carcass data was collected, and samples were removed from each carcass for subsequent fatty acid, sensory, shear force and lipid oxidation analyses. Data were analyzed with dietary treatment in the model. Average daily gain tended ($P = 0.07$) to be greater for FISHCA than NONE or CA during the final 50 d on feed when treatment diets were fed. Hot carcass weight, dressing percentage, fat thickness, ribeye area or yield grade did not differ ($P > 0.05$) between treatments. Marbling score and quality grade were higher ($P < 0.05$) for CA and FISHCA than NONE. Lipid oxidation (TBARS, mg malonaldehyde/kg sample) was greater ($P < 0.05$) for FISHCA than CA or NONE, and TBARS values increased ($P < 0.05$) over storage time in all treatments. Warner-Bratzler shear force (WBS) values tended ($P= 0.06$) to be higher for CA than FISHCA, with NONE being intermediate. Sensory panelist off-flavor scores were greater ($P < 0.05$) for FISHCA ground beef compared to NONE or CA, which did not differ ($P > 0.05$). Ground beef samples from steers fed NONE or FISHCA received higher ($P < 0.05$) juiciness and tenderness scores from sensory panelists compared to CA. Concentration of the cis-9, trans-11 CLA isomer was higher ($P < 0.05$) in ground beef from FISHCA than NONE or CA, which were similar ($P > 0.05$). Feeding supplemental oils increased marbling score and quality grades. Addition of fish oil with canola oil increased CLA concentration, lipid oxidation, and off-flavors of ground beef.

Key Words: Beef, Fish oil, CLA

W79 Effect of genotype and diet on daily weight gain and carcass quality traits. I. Holló[1], E. Szücs[2], G. Holló[2], J. Seregi[1], Z. Andrássy[1], Cs. Abrahám*[2], and I. Repa, [1]*University of Kaposvár, Kaposvár H-7401,* [2]*Szent István University, Gödöllö H-2103*.

The effect of feeding extensive (E) vs. intensive (I) diets on performance and carcass quality was compared using Holstein-Friesian (HF) and Hungarian Grey (HG) growing-finishing bulls (N=40). Means for initial weight and age for HF and HG were 293±36 kg and 321±69 day, respectively. Half of the breed groups were fed either grass silage/grass and low concentrate (E) or maize silage and high concentrate (I) based rations. The dietary energy levels in groups E and I were 73.7 and 92.7 MJ/kg DM, respectively (P<0.001). Live weight was recorded at monthly intervals and daily feed intake was measured. In group E and I days on feed lasted for 221 and 201, respectively. The highest ADG (1332±115 g/d, P<0.001) was recorded in the intensively fed group after the whole growing-finishing period. ADG of HF bulls in group E was lower, than that of their HG counterparts (764±91 vs. 837±102 g/d, P<0.001). The highest growth rate was recorded in the E of HG groups (1098±409 g/d, P<0.001) in the first 64 days of feeding, with lower ADG of their HF counterparts from between 0 - 93 days on feed (785±143 g/d, P<0.001). Within the E group, higher relative growth rate was recorded in HG than HF (P<0.001). Higher final weights were recorded in I group in comparison with that of group E (HF 564±12 and HG 546±49 kg vs. HF 473±20 and HG 467±61 kg, P<0.001 respectively). Carcass weight and length, amount of perinephric and trimmed fat were higher in group I (P<0.01), as well. Higher carcass lean meat content was recorded in HG breed. For treatments E and I means were 71.0 and 67.5%, respectively. The ratio of carcass bone varied in line with the four feet weight. Findings reveal that considerations on the utilization of the native HG

breed on development of novel beef cattle production systems especially on roughage based diets seems to be justified.

Key Words: Feeding intensity, Breed difference, Carcass quality

W80 Evaluation of marbling by US scoring system and video image analysis. J. Tözsér[1], I. Holló[2], G. Holló[2], E. Szücs*[1], R. Zándoki[1], J. Seregi[2], and I. Repa[2], [1]*Szent István University, Gödöllö, H-2103,* [2]*University of Kaposvár, Kaposvár H-7401.*

The visible proportion and distribution of intramuscular fat in M. longissimus dorsi, called marbling, is the most important factor influencing quality grade in the United States and Canada (Boggs et al, 1995). In Europe carcass value is determined by conformation and fatness traits, in spite of it, marbling is often demanded as a primary quality trait of beef by consumers or in labeled products (Chambaz et al, 2002). There have been several methods developed to evaluate intramuscular fat content (Baker, 1986; Rekaya et al, 1999; Hassen et al, 1999; Chambaz et al, 2002). The aim of this research was to determine the correlation between results received by subjective scoring (USA, 1-6) and by video image analysis (VIA). Native Hungarian Grey (HG), and Holstein-Friesian growing-finishing bulls were housed in confinement on deep litter and fed on corn silage, hay and concentrate (6 kg/day) based diets for 210 days in two groups with 10 head of each. Average age and weight at slaughter for HG and HF were 552 and 474 days, and 545 and 578 kg, respectively. Pictures of longissimus muscle cross section were taken by video camera and analyzed by software Terlet V 7.0 developed by Mosoni (2000). Marbling is evaluated using brightness of picture taken. Surfaces with more than 200 brightness units were measured in two replications. Data processing was made with SPSS10 statistical program package. Marbling score for HG bulls was 1.5 when evaluated by subjective scoring and 1.29% determined by VIA. For HF bulls, the values were 1.1 scores and 0.43%, respectively. In terms of marbling significant differences ($P<0.01$) were established between breeds using VIA, while no significant differences were recorded by subjective scoring ($P<0.1$). Correlations between the two marbling evaluation procedures for both breeds (HG: VIA=0.1133+0.7878*USA, r=0.71; HF: VIA=-0.7556+1.0778*USA, r=0.86) suggested the appropriateness of both methods in the evaluation of marbling in beef.

Key Words: Marbling, VIA, Cattle breeds

W81 Evaluation of ultrasonic estimates of fat thickness and *longissimus* muscle area in de-haired hanging beef carcasses at chain speed. T. Perkins* and A. Rimal, *Southwest Missouri State University.*

The objective of this study was to evaluate the accuracy of real-time ultrasound measurements of *longissimus* muscle area (REAU) and 12th-rib fat thickness (FTU) in hanging de-haired beef carcasses at regular plant chain speed. A certified ultrasound technician took measurements on 387 head of slaughter cattle using an ALOKA 500V ultrasound unit and Beef Image Analysis (BIA) image interpretation computer software. Carcasses were ultrasounded immediately after de-hairing at a pace of one carcass every 12-15 seconds in a hanging position on the rail. Carcass ribeye area (REAC), carcass fat thickness (FTC) and calculated yield grade (CYG) were collected 24 hours after harvest and scanning. Means for hot carcass weight (HCW), REAU, FTU, REAC, FTC, and CYG were 368.5 32.9 kg, 83.44 9.96 cm^2, 1.10 0.36 cm, 83.79 10.5 cm^2, 1.08 0.46 cm and , respectively. Pearson correlations for REAU and REAC, FTU and FTC, REAC and CYG, REAU and CYG, FTC and CYG, and FTU and CYG were 0.53, 0.72, -0.77, -0.39, 0.86 and 0.65, respectively. These data suggest that ultrasound can accurately assess carcass compositional differences in hanging beef at chain speed. However, the removal of hair prior to scanning is a must to keep up with the speed of the carcass movement every twelve to fifteen seconds.

Key Words: Ultrasound, De-haired, Beef

W82 Effect of breed, sex, and slaughter weight on meat quality of lambs. J. Peinado*[1], P. De Miguel[2], D. García[3], M. Cortés[1], and M.I. Gracia[1], [1]*Imasde Agropecuaria, S.L., Spain,* [2]*GRUPO CARNICO MAGNUS, S.A., Spain,* [3]*Estacin Tecnolgica de la Carne de Guijuelo, Spain.*

A total of 480 lambs was used to study the influence of breed, sex, and slaughter weight (SW) on meat quality. There were eight treatments arranged factorially with two breeds (Castellana *vs* Merino), two sexes (female *vs* male), and two SW (26 *vs* 31 kg). Each treatment was replicated six times and ten lambs penned together formed the experimental unit. All the lambs received a common pelleted diet based on barley, wheat, and soybean meal. Wheat straw was offered *ad libitum*. Following slaughter, carcasses were stored for 24 h at 2 ± 1 C. Then, samples from the *longissimus* muscle from the left side of two lambs per replicate were obtained and divided into two portions. Water holding capacity, chemical composition, and color were measured in the first portion (L1, 6th to 10th dorsal rib) and shear force was measured in the second portion (L2, 11th to 13th dorsal rib). Samples from L1 were stored at -20 C, whereas samples from L2 were previously stored for three d at 4 C and then frozen. Loins from Castellano lambs had more fat content than loins from Merino lambs (4.6 *vs* 4.2 %; $P < 0.05$), and loins from females had more fat content than loins from males (4.8 *vs* 4.0 %;$P < 0.05$). Loins from females had lower a* and higher L* values ($P < 0.05$), and had less cooking losses (21.3 *vs* 19 %; $P < 0.05$) than loins from males. An increase in slaughter weight increased fat content of the loin (5.30 *vs* 3.49 %; $P < 0.05$). Loins from lambs slaughtered at 31 kg had greater cooking losses (21.4 *vs* 18.9 %; $P < 0.05$), and higher a* but lower L* values ($P < 0.05$) than loins from lambs slaughtered at 26 kg. Also, SW tended to increase shear force (Warner-Bratzler values of 7.67 and 6.74 kp; $P < 0.10$). It is concluded that meat quality of lambs can be adapted to different markets by manipulating breed, sex, and weight at slaughter.

Key Words: Lambs, Slaughter weight, Meat quality

W83 Cholesterol level and sensory evaluation of lambs of various hair x wool sheep crosses. S. Wang*, T. D. Bunch, R. C. Evans, C. P. Brenand, D. R. Whittier, and B. J. Taylor, *Utah State University, Logan, Utah, USA.*

The cholesterol level and sensory evaluation were compared in six lambs from each of the following genotypes: 1) St. Croix hair sheep, 2) St. Croix x wool sheep, 3) Callipyge wool x St. Croix, 4) Dorper hair sheep x St. Croix, 5) Dorper x wool, Callipyge wool x wool, and 6) wool x wool. Meat cholesterol was extracted by chloroform-methanol mixture and the cholesterol levels were determined by spectrophotometric measurement of the color generated by the reaction of cholesterol with glacial acetic acid-$FeSO_4$-H_2SO_4. A 9-point hedonic ballot ranging from 9 (like extremely) to 1 (dislike extremely) was used for the sensory evaluation based on the following index: flavor, tenderness, juiciness and overall quality. The general linear model (GLM) ANOVA procedures and Fisher's LSD multiple-comparison test were used to determine the difference among genotypes. Cholesterol levels (mg/100g fresh meat) were 249.6, 170.1, 73.2, 130.7, 149.2, 50.4 and 116.5, respectively. The cholesterol level in the hair sheep (St. Croix) is significantly higher ($P < 0.05$) than all the other genotypes and the lowest is in the Callipyge crosses. Significant differences ($P < 0.05$) existed between genotypes for every sensory characteristic measured. St. Croix had the highest overall sensory acceptance rating (6.8) and the lowest in the Callipyge wool x wool. As cholesterol correlates to fat composition of the tissue these differences may account for the differences found between crosses in the sensory evaluation data.

Key Words: Cholesterol, Sensory evaluation, Sheep

Breeding & Genetics

W84 Estimation of correlations of reproductive traits with blood serum IGF-I concentration in Angus beef cattle. A. Yilmaz[1], M. E. Davis*[1], R. C. M. Simmen[2], and H. C. Hines[1], [1]*Department of Animal Sciences, The Ohio State University,* [2]*Department of Animal Science, University of Florida.*

The objectives of this study were to obtain estimates of heritabilities and genetic (rA1A2), environmental (rE1E2), and phenotypic (rP1P2) correlations of insulin-like growth factor I (IGF-I) concentration with scrotal circumference (SCR), percentage of motile (MOT) and morpho-