was highest for the 3SP mix. The 2SP mix had the highest NDF and lowest IVDMD. DMI, milk yield, milk fat and protein, and rumen NH_3-N were not affected by treatment. Milk urea N increased on the most complex mix (9SP). Rumen pH and VFA tended to be higher for the 2SP mix. Acetate:propionate decreased with increasing level of pasture diversity. Level of forage diversity did not have a major impact on DMI or productivity of grazing dairy cows. However, forage production and carrying capacity were greater on the complex mixtures than on the 2SP mix.

	2SP	3SP	6SP	9SP	SEM	P
Pasture CP, % DM	21.8	22.1	20.3	19.0	0.46	0.002
Pasture NDF, % DM	36.6	31.7	29.2	24.7	1.57	<0.001
Pasture IVDMD, % DM	66.6	70.4	67.2	70.9	1.20	0.02
Total DMI, kg/d	23.9	22.9	22.8	22.0	0.53	0.13
Pasture DMI, kg/d	14.7	13.7	13.6	12.8	0.46	0.08
Milk, kg/d	35.4	36.3	35.2	35.3	0.31	0.10
Milk Fat, %	3.55	3.38	3.44	3.46	0.07	0.41
Milk Protein, %	2.73	2.72	2.74	2.72	0.02	0.95
MUN, mg/dl	12.9	11.8	12.7	13.3	0.27	0.03
Rumen pH	5.84	5.68	5.64	5.76	0.06	0.11
VFA, mmol/mL	156.4	140.8	144.0	145.6	4.45	0.09
Acetate:Propionate	2.93	2.83	2.68	2.65	0.02	<0.001
NH_3-N, mg/dl	17.4	14.9	16.1	15.4	0.87	0.20

Key Words: Pasture, Dairy, Forage diversity

Growth & Development: Somatotropic axis and adipose development

372 Preadipocyte recruitment is enhanced by ciglitazone or troglitazone in subcutaneous adipose stromal-vascular (S-V) cell cultures, but not intramuscular S-V cell cultures.

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Intramuscular adiposity enhances marketability of meat products. Our understanding of intramuscular adipocyte development is limited. Though studies have shown marbling fat can be modified, intramuscular S-V cultures show these cells do not respond to dexamethasone as do subcutaneous cells. The aim of this study was to determine the adipogenic potential of porcine S-V cells from subcutaneous adipose tissue (SQ) and semitendinosus muscles (STM) using the insulin sensitizing agents, ciglitazone or troglitazone. SQ and both STM from 5-7 day old pigs were asceptically removed and S-V cells obtained from each tissue following a standard collagenase digestion. STM S-V cells were plated on laminin coated culture dishes to maintain a myotube-rich environment. S-V cells from each tissue were plated in media containing fetal bovine serum and 0.01%DMSO supplemented with 0, 10, 25, 50 μM ciglitazone or troglitazone. Upon confluency, cells were switched to insulin containing media for 3 days. Immunohistological evaluation for AD3, a preadipocyte antibody, was used to assess preadipocyte recruitment. Differences between treatments were determined using least square contrasts and $p<0.05$ was considered significant. AD3 cell number per microscopic field was increased in SQ cultures as compared to STM cultures (24.1 16.4 vs 9.8 5.5; $p<0.0001$) regardless of treatment. A dose response curve reveals 10μM ciglitazone or troglitazone treatment increases AD3 cell number per field in SQ S-V cultures (15.3 7.8, DMSO control; 30.5 7.8, ciglitazone, 38.9 7.8, troglitazone; $p<0.05$) though increasing doses in either treatment did not increase AD3 cell number. This is in contrast to STM S-V cultures which did not show an increase in AD3 number at 10, 25, or 50 μM ciglitazone or troglitazone treatment ($p>0.05$). Myotube formation in STM S-V cultures was maintained regardless of treatment. These results suggest intramuscular adipogenesis regulation may be different than that of adipogenesis in subcutaneous adipose. This information is key to the use of STM S-V cultures as cell model systems for marbling fat.

Key Words: Adipose, Porcine, Intramuscular

373 Investigation of the molecular mechanism underlying the anti-adipogenic action of retinoic acid in cultured pig preadipocytes.

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Retinoic acid (RA), the active metabolite of vitamin A, inhibits adipocyte differentiation in vitro. However the mechanism by which RA exerts this effect is poorly understood. The objective of this study was to investigate the molecular mechanism underlying the anti-adipogenic action of RA in cultured pig preadipocytes. In order to determine which member of the RA receptor superfamily mediates this action, porcine stromal-vascular cells were cultured in induction medium (DME/F12 medium containing 100 nM insulin, 10 ng/ml transferrin and 500 ng/ml hydrocortisone) and treated with either carrier (DMSO) or increasing amounts (10 nM to 25 μM) of individual retinoid ligands. On day 8 of culture, glycerol-3-phosphate dehydrogenase activity (GPDH) was measured as a late marker of preadipocyte differentiation. Addition of either RA or 9-cis retinoic acid (9c-RA) to the medium reduced GPDH activity ($P<.001$). However, 9c-RA was less potent requiring a higher dose in order to exert an effect. Addition of TTNPB, a RAR-selective ligand, potently inhibited GPDH activity ($P<.001$). In contrast, methoprene acid, a RXR-selective ligand, significantly increased GPDH activity ($P<.001$). Next, increasing amounts (10 nM to 25 μM) of Ro61, a potent RAR-selective antagonist, were added in the presence of 10 nM TTNPB. Ro61 significantly blunted the ability of TTNPB to inhibit differentiation at all concentrations tested ($P<.0002$). These data taken together indicate that the RAR receptor mediates the anti-adipogenic action of RA in pig preadipocytes. We next investigated whether RA action is dependent upon MAP kinase activity by testing the ability of 10 nM TTNPB to inhibit differentiation in the presence of either 10 μM or 25 μM of PD98059 (MAP kinase inhibitor). PD98059 failed to blunt the anti-adipogenic action of TTNPB at either concentration. These results indicate that the anti-adipogenic action of RA is mediated by the RAR receptor and is independent of the MAP kinase pathway in cultured pig preadipocytes.

Key Words: Retinoic acid, Adipocyte differentiation, Pig

374 Effects of Ralgro implantation to gestating sows on sow and piglet performance and components of the somatotrophic axis.

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Objectives were to determine effects of an estrogenic compound (Ralgro; R) on maternal and neonatal piglet performance and components of the somatotrophic axis. On d 60 of gestation, sows were divided into two groups: R (n=7) and control (C; n=4). Treated sows were administered 36 mg R subcutaneously in the ear, and C sows were administered a sham implant. Sow blood samples were collected on d 60 and 80 of gestation and at parturition. Piglet blood samples and BW were collected within 12 hrs of birth. Thereafter, piglet BW were collected on d 7 and 14 of age. Serum was collected from blood samples and stored at -80C until analyzed for serum concentrations of IGF-I, IGF-II, and growth hormone (GH). Data were analyzed using ANOVA with treatment and pig sex as main effects. There were no differences ($P > 0.38$) in serum concentrations of IGF-I or GH between C and R sows; however, there was a trend ($P < 0.10$) for increased serum concentrations of IGF-II in R sows from d 60 of gestation to parturition. There was no difference in litter size ($P < 0.14$), number born alive ($P < 0.33$), or piglet survival to weaning ($P < 0.21$); however, there was a trend ($P < 0.11$) for greater total litter weight in C sows (19.4 $\pm$ 2.3 vs 15.4 $\pm$ 1.2 kg; C vs R). There was no difference ($P > 0.47$) in piglet BW at birth (1.4 $\pm$ 0.04 kg), but there was a treatment effect ($P < 0.002$) on ADG to 7 d of age, with increased ADG in R pigs (0.19 $\pm$ 0.01 vs 0.16 $\pm$ 0.01 kg/d; R vs C). There was a tendency ($P < 0.07$) for increased ADG in R pigs to 14 d of age (0.254 $\pm$ 0.01 vs 0.231 $\pm$ 0.01 kg/d; R vs C). Treatment affected piglet serum concentrations of IGF-I ($P < 0.006$; 52.8 $\pm$ 3.7 vs 38.4 $\pm$ 3.8 ng/mL; R vs C) and IGF-II ($P < 0.0004$; 83.2 $\pm$ 1.5 vs 74.6 $\pm$ 1.8

ng/mL; R vs C) at birth; but had no effect (P < 0.18) on serum concentrations of GH (14.4 ± 1.3 vs 17.2 ± 1.9 ng/mL; R vs C). These data indicate that *in utero* Ralgro treatment increases circulating concentrations of somatotrophic hormones, and improves piglet ADG during the first 14 d of life.

Key Words: growth, Ralgro, pigs

375 Level of nutrition and breed can influence basal and β-adreneregic stimulated fat mobilization in lambs. B. J. Leury[1] and F. R. Dunshea*[2], [1]*School of Agriculture & Food Systems, The University of Melbourne, Victoria, 3010,* [2]*Department of Primary Industries, VIAS, Werribee, Vic, 3030.*

Six four month old wether lambs were used in a study to investigate the interactions between breed and level of feed intake on lipolytic response to acute intravenous challenge with clenbuterol (CLEN). Three Merino (initial weight 24.2±1.05 kg) and three Border Leicester x Merino (23.1±1.55 kg) were fed at .5 maintenance (M) for 7 days followed by 1.5M for a further 7 days. On day 7 of each feeding period the lambs were injected intravenously with .122 and 9.9 μg/kg CLEN at 0830 and 1530 h, respectively. Blood samples were taken for 30 min before and 120 min after each injection and plasma analysed for non-esterified fatty acid (NEFA) concentrations. Basal NEFA concentrations were higher in wethers consuming .5 M as compared to 1.5 M (.77 v .45 mM, P<.001). While there was no significant main effect (P=.17) of breed on basal NEFA concentrations, there was an interaction (P=.07) between breed and feed intake such that while there was no difference in basal plasma NEFA concentrations in Merinos and crossbreds when fed at 1.5 M (.43 v .47 mM), basal plasma NEFA concentrations were increased to a lesser extent in Merinos than in crossbreds when fed at .5 M (.61 v .93 mM). CLEN caused an acute increase in plasma NEFA, with the response above basal being greater in wethers fed at .5M as compared to 1.5M (.89 v .61, P=.004). There was no effect of breed (P=.60) or dose of CLEN (P=.72) on the increase in plasma NEFA in response to CLEN. These data suggest that both breed and level of nutrition can influence basal and β-adreneregic stimulation of fat mobilization.

Key Words: Lambs, Clenbuterol, Fat mobilization

376 Peripheral leptin administration alters hormone and metabolite levels in the young pig. T. G. Ramsay*[1], J. A. Bush[2], J. P. McMurtry[1], M. C. Thivierge[2], and T. A. Davis[2], [1]*USDA-ARS,* [2]*USDA-ARS Children's Nutrition Research Center.*

The present study was conducted to determine if peripheral leptin administration can alter GH secretion or feed intake in the young pigs. Six, 6 kg female pigs were fed twice daily at 0800 (3%BW) and 1500 h (3 %BW) a diet containing 24% crude protein prior to the study. Animals were fasted overnight and randomly chosen to receive porcine recombinant leptin or saline injections. The dose of leptin given per pig was initially 500 μg/kg body weight (BW) (L500) in 0.2% BSA as a bolus injection into the carotid artery. Blood samples were obtained from the jugular vein over a 24- h period. Feed was presented to each pig at 1h following leptin injection with subsequent re-weighing of food every 2h. Three days later in a cross-over design, the experiment was repeated with a leptin dose of 100 μg/kg BW (L100) or saline. Three days following this experiment, the experimental protocol was repeated with a leptin dose at 200 μg/kg BW (L200) or saline. Leptin reduced intake in pigs treated with L500 and L200 (P<0.05), but did not affect pigs treated with L100 (P>0.05). Blood glucose was depressed in pigs treated with L500 or L200 (P<0.05). Plasma non-esterified fatty acid (NEFA) remained elevated following feed presentation in pigs treated with L500 or L200(P<0.05). Plasma insulin levels were elevated by feeding in control animals, while insulin levels were depressed in pigs treated with L500 or L200 (P<0.05). In all experiments, leptin injection elevated plasma leptin levels (P<0.05). Plasma growth hormone (GH) was significantly elevated in pigs treated with L200 (P<0.05) with three peaks apparent at 5, 8, and 13 h post injection. The ability for a single injection of leptin to produce significant changes in hormone and metabolite levels suggests that this peptide has a role in regulation of peripheral metabolism.

Key Words: Leptin, Pig, Growth hormone

377 Porcine somatotropin reduces the magnitude of, and the variation in, back fat. F. R. Dunshea*[1] and R. G. Trainor[2], [1]*Department of Primary Industries, VIAS, Werribee, Vic 3030, Australia,* [2]*Alpharma Animal Health, Toorak, Vic 3142, Australia.*

Data from 16 on-farm studies (average 28 days) conducted across Australia were analysed to determine the effect of pST and sex on growth performance and on descriptive statistics of back fat depth. All studies contained both boars and gilts (1452 pigs in total) and the statistical analyses were performed on the means or descriptive statistics from each study. Daily pST treatment increased daily gain (785 v 931 g/d, P<.001) and decreased feed intake (2.59 v. 2.30 kg/d, P<.001) and FCR (3.73 v. 2.60, P<.001) in both sexes. Final back fat at the P2 site was lower (P<.001) in boars than in gilts and decreased (13.9 v 12.0 mm, P<.001) by pST treatment. However, there was an interaction (P=.016) such that pST was reduced to a greater extent in gilts (- 2.2 mm) than in boars (-1.5 mm). The average maximum P2 observed in each study was not significantly different between boars and gilts (17.0 v. 17.7 mm, P=.13) but was decreased by pST treatment (18.2 v. 16.6 mm, P<.001). The average minimum P2 observed in each study was lower in boars than in gilts (9.2 v. 9.9 mm, P=.007) and tended to be decreased by pST treatment (18.2 v. 16.6 mm, P=.067). However, there was an interaction (P=.037) such that the minimum P2 was only reduced by pST in gilts. The P2 median and mode showed similar responses to sex and pST as the mean P2. The range in P2 was less in pigs treated with pST (8.4 v. 7.3 mm, P=.021). Likewise, the variance in P2 was reduced by pST treatment (5.2 v. 3.9 mm, P=.005). There was no effect of pST on kurtosis of the distribution but pST did tend to increase the skewness of the distribution (.33 v. .56 mm, P=.092). A higher value for the skewness suggest that there is a tail in the high region of P2. In conclusion, pST increases growth performance and decreases the magnitude of, and variation in, P2 back fat.

Key Words: Back fat, pST, Pig

378 Validation of a ghrelin radioimmunoassay (RIA) for use in evaluating physiological factors that influence plasma ghrelin concentrations in beef cattle. A. E. Wertz*, T. J. Knight, C. C. Ribeiro-Filho, D. C. Beitz, and A. Trenkle, *Iowa State University, Ames.*

Plasma pooled from beef steers was used to validate the efficacy of a commercial RIA for the first 11 amino acids of rat ghrelin. The first 11 amino acids that contain the n-octanoyl moiety necessary for biological activity are identical for rats and cattle. Binding of the anti-rat ghrelin antibody to ghrelin in the standard curve and ghrelin in serial dilutions of bovine plasma was parallel. This result indicates that anti-rat ghrelin antibody binds similarly to rat and bovine ghrelin in plasma. This assay was used to quantify plasma ghrelin concentrations of cattle assigned to a 3x2 arrangement of metabolizable energy (2.4, 2.7, or 3.0 Mcal/kg) and frame score (large or small). Large frame (n=18) and small frame (n=18) Angus crossbred steers were separated from a herd of 120, and metabolizable energy density was assigned to six steers of each frame size. Steers were allowed ad libitum access to their assigned diet for 196 d via Calan gate-equipped bunks. At 28-d intervals, a blood sample was collected via jugular venipuncture. Plasma ghelin concentrations were analyzed statistically as repeated measures in time by using the MIXED procedure of SAS, and steer nested within diet by frame score was used as a random variable. Differences that resulted from metabolizable energy density, frame score, or length of feeding period were separated by least squared means. Plasma ghrelin concentration increased (P $\leq$ 0.05) as length of the feeding period increased. However, plasma ghrelin concentration did not differ significantly as a result of frame score or metabolizable energy density. This nonsignificant difference in plasma ghrelin concentration is accounted for partially by increased intake of the low- and medium-energy diets to compensate for differences in metabolizable energy density. The commercial RIA for detecting n-octanoylated rat ghrelin is efficacious for detecting n-octanoylated bovine ghrelin. Among beef cattle, plasma ghrelin concentrations increase as length of the feeding period increases.

Key Words: Ghrelin, Cattle, Metabolizable energy

379 Dose dependent growth suppression of broiler chicks injected with 5α-dihydrotestosterone. S. E. Nicolich*, T. D. Faidley, and D. R. Thompson, *Merck Research Laboratories, Somerville, NJ* .

Selective androgen receptor modulation may offer some potential to influence musculature and skeletal structure of broilers. To examine the effects of the anabolic steroid 5α-dihydrotestosterone (DHT) on growth, broiler chicks were injected (5X weekly) with 0, 1, 3, or 10 mg/kg. Peterson X Arbor Acres, male broiler chicks, 8 days of age, were housed 5 per pen and given free access to water and a commercial broiler mash. There were 5 pens of chicks on each treatment level. After 3 weeks of injections, all the 10 mg/kg birds and 10 chicks from each of the other treatment levels were necropsied. Feed consumption, weight gain, and efficiency of gain were decreased with increasing DHT. Weights of breast fillet, thigh muscle, metatarsus, and femur were also decreased with increasing DHT. Heart weight, when expressed as a percent of carcass weight, was increased with DHT, as was comb weight and comb redness. DHT in broiler chicks did not improve growth performance or demonstrate anabolic effects on skeletal muscle.

Dose (mg/kg day)	0	1.0	3.0	10.0	SEM
Feed consumption (g/bird)	1503.8^a	1483.0^a	1324.2^b	1149.6^c	34.5
Wt. gain (g/bird)	1083.0^a	1035.0^a	893.6^b	681.0^c	48.2
Efficiency of gain (gain/feed)	0.72^a	0.70^a	0.67^b	0.63^c	0.01
Comb wt. (g)	0.8^a	2.1^b	3.3^c	4.7^d	0.2
Comb color (a*)	$11a^a$	20^b	$22^{b,c}$	23^c	1
(L*)	59^a	48^b	44^c	42^c	1
(b*)	16^a	$15^{a,b}$	$14^{b,c}$	12^c	1
Body wt. (g)	1284^a	1236^a	1029^b	843^c	48
Heart wt. (g)	7.3	7.6	7.2	7.0	0.6
Whole breast (g)	291^a	289^a	231^b	175^c	12.1
Breast fillet (g)	99^a	93^a	78^b	57^c	4.4
Whole right leg (g)	160^a	156^a	127^b	109^c	6.3
Right thigh muscle (g)	54^a	53^a	45^b	40^b	2.7
Right metatarsus (cm)	13.0^a	12.9^a	11.8^b	10.9^c	0.2
Right femur (g)	10.0^a	9.4^a	7.5^b	6.3^c	0.5
Right metatarsus (g)	29^a	29^a	23^b	20^c	1.3

^{abcd} Values with different superscripts differ (P<0.05).

Key Words: Growth, Anabolic steroid, Broiler

380 Expression of myostatin and myogenin in Landrace barrows selected for increased loin eye compared to a control line. G. N. Scheuermann[1,2], K. Nadarajah[1], D. L. Kuhlers[1], S. P. Lino[1], and D. R. Mulvaney*[1], [1]*Auburn University, Auburn, AL,* [2]*EMBRAPA, Brazil.*

Myogenin (MG) genotype or gene expression has been shown to be related to leanness in pigs and myostatin (MSTN), a member of the TGF-β family of growth factors, is a negative regulator of muscle mass through involvement in the myogenic regulatory gene pathway. Our objective was to compare their expression in 100 kg Landrace barrows (n=11) resulting from five generations of selection for increased ultrasound loin eye area (ULEA) compared to controls (n=9). Data characterizing these lines have been previously reported but in general, select line ULEA were 10.6 cm^2 larger and average ultrasound backfat (BF) 0.33 cm less than controls. Immediately after harvest, replicate samples of the longissimus muscle were placed in Trizol® , homogenized, frozen in liquid nitrogen and stored at -85 C. RNA was extracted, quantified and used as template in an RT-PCR procedure (Qiagen®) to amplify expression of myostatin, myogenin and 18S ribosomal PCR cDNA products. Primers for myostatin, myogenin and 18S amplified single electrophoretic bands of predicted size. Densitometric procedures were used to determine relative expression as normalized to 18S cDNA, and data were subjected to ANOVA using GLM procedures of SAS accounting for line and replicate as main effects. Myostatin mRNA expression was 10% higher (P<.05) and myogenin 14.5% lower (P<.05) in select line barrows compared to controls. Correlation analysis of MSTN or MG gene expression to typical carcass parameters (backfat, loin eye area, length, %lean cuts, ham, loin, shoulder, belly weights, slaughter weight, and carcass weight), revealed no significant relationships except for a negative correlation of MG to live and carcass weights (P < .05). These data show differences in MSTN and MG mRNA expression between the Select and Control line pigs, which differ in their leanness, and indicate that MG mRNA could be further explored for use in marker assisted selection strategies.

Key Words: Pigs, Myogenin, Myostatin

381 Insulin signaling in bovine myogenic cells. R. A. Hill*[1], M. V. Dodson[2], A. Gertler[3], N. J. Hughes[1], D. Henderson[1], and T. A. Kokta[1], [1]*University of Idaho,* [2]*Washington State University,* [3]*Hebrew University of Jerusalem, Israel.*

Intracellular insulin-signaling pathways have been well characterized across species, but the precise mechanisms in production animals are still not clear. Insulin mediates energy substrate uptake, storage, and oxidation in peripheral tissues; promotes protein accretion (particularly in muscle) and cell proliferation. Thus, insulin-signaling pathways are complex and interact with a host of other mediators in regulation of each specific metabolic activity. Our present investigations focused upon insulin mediation of energy substrate utilization, and aimed to characterize the signaling pathways activated in bovine muscle. Our data suggest that insulin receptor (IR) signaling results in activation of phosphatidylinositol-3-hydroxy kinase (PI3-K) in primary myogenic cell (PMC) cultures. PMC were cultured in complete medium (CM), washed and exposed to various insulin concentrations (850, 85, 8.5 or 0.85 nM) in a defined medium, or CM control for 24 hr. Cells were then rapidly frozen in liquid nitrogen and the cell lysate harvested and stored at #80 C. Lysates were immunoprecipitated with specific anti-insulin receptor antibodies or anti-PI3-K antibodies, resolved on SDS-PAGE, transferred to nitrocellulose and total and phosphorylated specific protein detected using the Li-Cor Odyssey infrared imaging system. Precipitating antibodies (raised in rabbits, used for total protein detection) or anti-phosphotyrosine antibodies (raised in mice, for detection of phosphorylated proteins) were used for simultaneous evaluation of immobilized proteins on immunoblots. Phosphorylated proteins were expressed as a proportion of total specific protein detected. Approximately 0.01 IR appeared to be phosphorylated, and no variation across treatments was detected (P>.05). However, PI3-K was detected as a doublet (52 and 55 kDa) and the proportion phosphorylated was greater (P < .01) compared to CM in response to the highest insulin concentration (850 nM). At lower insulin concentrations PI3-K phosphorylation was similar to CM (P>.05). Although a differential response in IR activation was not detected, it was evident in the highly abundant PI3-K. These data suggest that a more complete characterization of insulin-mediated activation of PI3-K and other signaling molecules in beef animals is warranted.

Key Words: Insulin signaling, Phosphatidylinositol-3-hyrdoxy kinase (PI3-K), Muscle

382 Two-site evaluation of the relation between *in vivo* and carcass dual energy x-ray absorptiometry (DXA) in pigs. A. M. Scholz*[1], A. D. Mitchell[2], M. Foerster[1], and V. G. Pursel[2], [1]*University Munich, Experimental Farm, Germany,* [2]*USDA, Agricultural Research Service, Beltsville, MD.*

An evaluation study was performed to compare the compatibility of body composition results of two pencil-beam DXA scanners of the same manufacturer (GE Lunar, Madison). One DXA scanner (DPX-L) is located at the USDA in Beltsville and the upgraded version (DPX-IQ) at the Experimental Farm in Oberschleissheim, Germany (LVG). Pigs between 60 and 138 kg live body weight were scanned *in vivo* (**IV**) and subsequently *post mortem* using the right carcass (**C**) half (without head and viscera) as DXA reference side – with n=220 for the USDA data and n=62 for the LVG data. A linear regression was used to analyze the relationship between the *in vivo* and carcass data (DXA; and chemical analysis or dissection – left **C** half). Basically, both devices share the same technical platform. The regression coefficient (R^2) for the relation between the DXA soft tissue attenuation coefficient and the DXA fat percentage (FAT%) is very high for the joint data **IV** and for the **C** data (R^2>.99, $\sqrt{}$MSE<.75). Generally, there is a medium to high relation between the **IV** and **C** DXA data considering the joint data of both sites. Fat% has a R^2=.66 ($\sqrt{}$MSE =5.03) for the relation between **IV** and **C** half results, while lean percentage (LEAN%) has a R^2=.59 ($\sqrt{}$MSE=5.59). The smallest agreement between **IV** and **C** DXA data exists for the bone mineral percentage (BM%: R^2=.09, $\sqrt{}$MSE=.30), while the **IV** and **C** measurements for bone mineral density (BMD) are highly related: R^2=.87, $\sqrt{}$MSE=.02 (only LVG). The R^2 values are higher within each of the two sites. FAT% has a R^2=.79 ($\sqrt{}$MSE=3.46),

and LEAN%: R^2=.76 ($\sqrt{}$MSE=3.77) for USDA. Slightly higher relationships exist for LVG (FAT%: R^2=.85, $\sqrt{}$MSE=1.6; LEAN%: R^2=.84, $\sqrt{}$MSE=1.65; BM%: R^2=.38, $\sqrt{}$MSE=.19). In addition, there is a high agreement between DXA fat% and chemical lipid% (**IV**: R^2=.84, $\sqrt{}$MSE=1.94, USDA) or dissection fat% (**IV**: R^2=.74, $\sqrt{}$MSE=1.70, LVG). The observed site differences in the relationship between *in vivo* (**IV**) and carcass (**C**) results may depend on several factors like different genetic material (distribution of fat tissue within the body), software versions, beam hardening due to 'age' differences of the DXA scanners, feeding, and housing conditions. Though, there is a moderate to high general agreement between *in vivo* and carcass results, site-specific constraints have to be considered in multi-site studies using comparable DXA scanners.

Key Words: Dual energy x-ray absorptiometry, Body composition, Accuracy

383 Development and evaluation of a growth model to assist individual cattle management. L. O. Tedeschi* and D. G. Fox, *Cornell University, Ithaca, NY 14853*.

A deterministic and mechanistic growth model was developed to dynamically predict growth rate, accumulated weight, days required to reach target body composition, carcass weight and composition of individual beef cattle for use in individual cattle management systems. Two iterative methods based on gain composition were derived to compute the efficiency of metabolizable energy to net energy for growth. This growth model was evaluated with data from 362 individually fed steers with measured body composition and feed energy values predicted with the NRC (2000). The model accounted for 89% of the variation with bias of -2.6% in predicting individual animal ADG and explained 83% of the variation with bias of -1% in estimating the observed weight at the actual total days on feed. When ADG was known, the growth model predicted the dry matter required for that ADG with a bias of 2% and r^2 of 74%. A sub-model was developed to predict accumulated body fat (FAT) for use in predicting carcass quality and yield grades during growth. This sub-model explained 84% of the variation and had a bias of -14.3% in actual body fat when animal ADG was known. Additionally, an equation developed with 407 animals to predict yield grade from empty body fat (% of empty BW) had an r^2 of 0.49. Equations developed to predict carcass weight from empty BW that adjust for stage of growth accounted for 89% of the variation with a bias of 3 kg. We conclude this growth model can be used to predict ADG, BW, days required to reach a target body composition, dry matter required, and carcass weight of individual growing beef cattle with an acceptable degree of accuracy.

Key Words: Modeling, Simulation, Marketing

384 A feedlot model: predicting carcass quality and yield grade at re-implant time using real-time ultrasound. P. B. Wall*, G. H. Rouse, D. E. Wilson, R. G. Tait, and W. D. Busby, *Iowa State University Ames, IA*.

Commercial feedlot steers (n=404) were serially scanned using Real-Time Ultrasound (RTU) at 30-day intervals from re-implant time until slaughter. Cattle were evaluated for rump fat depth, longissimus muscle area (REA), 12th rib fat thickness (FTK), and percent intramuscular fat (%IMF) to determine the predictability of carcass composition at extended periods before slaughter. Additional background information on the cattle, such as weight, gain, breed of sire, implant, and frame score was also utilized. Carcass data was collected by trained personnel at "chain speed," and samples of the 12th rib longissimus muscle were taken for ether extract analysis to determine %IMF estimates. Simple correlation coefficients showed moderately high positive relationships between RTU measures taken less than 7 days before harvest and carcass measures: REA (r=.66); FTK (r=.74); and %IMF (r=.61). Correlation coefficients for RTU measures taken 96- 105 days before harvest and carcass values were: REA (r=.52); FTK (r=.58); and %IMF (r=.63). Regression equations were then developed for the carcass measurements; 46% of the variation could be explained for REA, 40% of FTK and 45% of marbling at re-implant time. Average daily gain ($p<.01$) and frame score ($p<.10$) were significant predictors of REA. RTU 12^{th} rib fat and rump fat were significant predictors of FTK ($p<.0001$). When predicting pre- slaughter ultrasound measures, R-squared values were higher for REA (R^2=.64), FTK (R^2=.62), and %IMF (R^2=.46). Additional regressions at 60-70 days and 30-40 days before harvest showed similar results, with R-squared values logically explaining more of the variation towards the slaughter date. Live ultrasound measure is a viable option for assessing carcass composition at re-implant time and predicting final quality and yield grades. These models may allow feeders to make marketing decisions in multiple phases of the feeding period.

385 Phenotypical characterisation regarding growth, hormones, and meat quality in bulls of two types of cattle as a source for segregating family structures. O. Bellmann*, J. Wegner, F. Schneider, F. Teuscher, and K. Ender, *Research Institute for the Biology of Farm Animals*.

The physiological and genetical background for transforming nutrients into body fat in secretion type of cattle or into body muscle in accretion type of cattle is still unknown. For that reason, we designed a study of segregating family structures using a population of Charolais (CH) cattle as a model for the accretion type and a population of German Holstein (H) cattle as a model for secretion type of cattle. In a first step the P0-generation was characterised phenotypically. The results presented in this paper were obtained from bulls starting at birth up to slaughter (18 months of age). 13 bulls of each metabolic type (CH and H) were raised using a tethering system with individual feeding. Samples of the semitendinosus muscle were taken by shot biopsy at 6, 8, 10, 13, and 16 months of age. Blood samples were taken by a single injection from the jugular vein on the same days as the muscle biopsy but prior to both biopsy sampling and feeding. At nine months of age blood sample collection in a frequent manner was started. At this time growth rate was at maximum, i.e. the transformation of nutrients into accreted protein and fat was at high levels. CH bulls did show higher body weights and the carcass contained more muscle protein and less fat than H bulls did. The higher body weight of the CH bulls is linked with higher muscle fiber cross section area. No differences were seen in the fiber type frequencies. The average plasma concentration of growth hormone did not differ, but differences in pulse frequency (CH 4.7 vs. H 3.5 pulses/6h) and amplitude were observed (CH 6.3 vs. H 10.1 ng/mL). Plasma concentrations of insulin, glucagon, and leptin also differed (insulin: CH 18.7 vs. H 28.1 U/mL; glucagon: CH 82.3 vs. H 120.8 pg/mL; leptin: CH 2.4 vs. H 3.0 ng/mL). The results suggest that different genetic based utilization of nutrients leads to pronounced protein synthesis in CH and elevated fat synthesis in H to meet the episodic energetic demands during lactation in this type.

Key Words: Cattle, Growth, Development

Nonruminant Nutrition: Minerals and vitamins

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387 Effects of dietary L-carnitine on semen characteristics in boars. D. M. Kozink, M. J. Estienne, A. F. Harper*, and J. W. Knight, *Virginia Polytechnic Institute and State University, Blacksburg, VA*.

The objective was to determine the effects of dietary L-carnitine on semen characteristics in boars. In Exp. 1, terminal-line boars (270 d of age) were fed daily a control diet (n = 9) or the control diet with L-carnitine (500 mg/d; Carniking; Lonza, Inc., Fairlawn, NJ) (n = 9). Semen was collected weekly from wk 0 to 15 and on four consecutive days during wk 16. For the weekly collections, there were no effects of treatment or treatment x time ($P > 0.1$) for gel-free volume (148.0 ± 3.3 mL), or total (55.9 ± 1.4 billion), morphologically normal (85.3 ± 0.7 %), or motile (87.2 ± 0.7 %) spermatozoa. Sperm concentration (billion/mL) was affected by treatment ($P = 0.08$; controls: 0.42, L-carnitine: 0.36, SE = 0.02) but not by treatment x time ($P > 0.1$). During the intensive collections, volume and total spermatozoa were not affected ($P > 0.1$) by treatment or treatment x time. Sperm concentration (billion/mL) was affected by treatment ($P = 0.08$; controls: 0.28, L-carnitine: 0.23, SE = 0.02) but not by treatment x time ($P > 0.1$). Experiment 2 was similar to Exp. 1 except boars (n = 10/treatment) were 525 d of age.