W44 Ontogenetic changes in fatty acid profiles from different tissues in growing Holstein bull calves. H. C. Hafliger, III*, P. C. Gentry, S. R. Sanders, L. H. Baumgard, and R. J. Collier, *University of Arizona, Tucson, AZ.*

Holstein bull calves were euthanized at 4 wk (n=6) or 12 wk (n=5) of age. Calves were fed milk replacer until 12 d of age, then a corn-based starter feed was offered ad libitum. At slaughter, abdominal (kidney) fat, skeletal muscle and hepatic tissue were snap frozen in liquid nitrogen, then stored at -80°C until assayed. In skeletal muscle and liver tissue, few differences between specific fatty acids, besides the trans profile, or Δ^9-desaturase ratios due to age were detected. In skeletal muscle, age significantly increased the content of *trans*-10, *trans*-11, and *trans*-12 from 5.0, 1.7 and 1.1 to 26.3, 3.2 and 2.1 mg/g of fat, respectively. Furthermore, skeletal muscle *trans*-10, *cis*-12 CLA content was increased ($P<0.09$) from <0.1 to 0.5 mg/g at wk 4 and 12, but *cis*-9 *trans*-11 CLA was unaffected by age and averaged 1.2 mg/g of fat. In hepatic tissue the trans profile remained stable with increasing age averaging 1.3, 2.3, 35.1 and 5.3 mg/g for *trans*-6-8, *trans*-9, *trans*-10 and *trans*-11 $C_{18:1}$ respectively, but *trans*-12 $C_{18:1}$ increased ($P<0.05$) from 1.9 to 3.0 mg/g from wk 4 to 12. Hepatic *trans*-10, *cis*-12 and *cis*-9, *trans*-11 CLA content did not change with age and averaged 2.8 and 2.3 mg/g of fat. In abdominal fat, *cis*-9, *trans*-11 and *trans*-10, *cis*-12 CLA increased ($P<0.05$) from wk 4 to 12 (1.4 to 2.1 and <0.1 to 1.0 mg/g of fat). Similar to hepatic tissue and skeletal muscle, the trans profile markedly increased with age and this was especially true for *trans*-10 $C_{18:1}$ which increased from 18 to 47 mg/g of fat respectively. Adipose ratios of $C_{14:0}/C_{14:1}$, $C_{16:0}/C_{16:1}$, and $C_{18:0}/C_{18:1}$ (proxy for Δ^9-desaturase) increased with age ($P<0.05$) suggesting an increase in rumen biohydrogenation and/or a decrease in the Δ^9-desaturase system. Concentrations of $C_{12:0}$, $C_{14:0}$, and $C_{14:1}$ decreased ($P>0.05$) symptomatic of a decrease in *de novo* synthesis and/or an increase in long chain fatty acid ($>C_{16:1}$) incorporation, which was observed. Overall as calves aged, products of rumen biohydrogenation tended to accumulate in tissues while *de novo* synthesized fatty acids decreased in content.

Key Words: Fatty acid, CLA

W45 Tissue deposition rates and empty body composition of purebred and crossbred Nellore bulls. A. Berndt[1], G. M. da Cruz[2], G. F. Alleoni[2], M. Alencar[3], and D.P.D. Lanna*[1], [1]*ESALQ/USP, Piracicaba, SP, Brazil,* [2]*CPPSe, EMBRAPA, Sao Carlos, SP, Brazil,* [3]*IZ, Nova Odessa, SP, Brazil.*

Nellore (NE) and crossbred Canchim x Nellore (CN), Angus x Nellore (AN) and Simental x Nellore (SN) young bulls with initial empty body weight of 294.3 kg were fed for 92-161 days. The diet had 60% corn silage and 40% concentrate, 13.8% CP and 71.5% TDN on a dry matter basis. Daily empty body gains (kg/day) were 1.34 (AN), 1.12 (CN), 1.39 (SN) and 1.03 (NE). To obtain baseline body composition 14 animals of the same group were slaughtered before feedlot. Animals were slaughtered when estimated hot carcass weight was greater than 225 kg and ultrasound backfat thickness over 4 mm. Results are presented on table 1. Data were analysed by GLM proceeding of SAS (SAS, 2001). Crossbreeding greatly improved growth rates and protein deposition rates, particularly for Angus and Simental. Nellore purebred and Canchin crossbred had the fattest gain. Angus and Simental were leaner at the same empty body weight. Crossbreeding improves the potential for carcass production from Nellore cows, however calves have increased net protein and energy requirements.

Table 1:	AN	CN	SN	NE
Empty Body Composition(%)				
Water	55.69^{b}	54.21^{b}	57.64^{a}	52.00^{c}
Ether Extract	20.70^{b}	22.30^{b}	18.59^{c}	24.68^{a}
Protein	18.94^{b}	18.84^{b}	19.06^{a}	18.70^{c}
Ash	4.67^{b}	4.65^{b}	4.71^{a}	4.62^{c}
Energy (Mcal/kg)	3.02^{b}	3.16^{b}	2.82^{c}	3.38^{a}
Period gain rates (kg/day)				
Water	0.63^{a}	0.44^{b}	0.70^{a}	0.36^{b}
Ether Extract	0.41^{a}	0.44^{a}	0.37^{a}	0.45^{a}
Protein	0.25^{a}	0.20^{b}	0.26^{a}	0.18^{c}
Ash	0.066^{a}	0.055^{b}	0.068^{a}	0.050^{b}
Energy (Mcal/day)	5.25^{a}	5.22^{a}	4.98^{a}	5.24^{a}
Empty Body Gain Composition (%)				
Water	46.59^{a}	38.18^{b}	49.83^{a}	33.38^{b}
Ether Extract	30.21^{b}	39.24^{a}	26.78^{b}	44.39^{a}
Protein	18.29^{a}	17.73^{b}	18.51^{a}	17.41^{b}
Ash	4.91^{a}	4.85^{ab}	4.88^{a}	4.81^{b}
Energy (Mcal/day)	3.87^{b}	4.69^{a}	3.56^{b}	5.16^{a}

Key Words: Body composition, Tissue deposition rates, Nellore crossbred

W46 Morphological, behavioral and physiological measurements and their relationships with growth in beef cattle. K. Uetake*[1], T. Ishiwata[1], N. Abe[2], and T. Tanaka[1], [1]*School of Veterinary Medicine, Azabu University,* [2]*Faculty of Agriculture, Tamagawa University.*

The objective of this study was to determine the important parameters that regulate skeletal and longissimus muscle growth of beef cattle. Thirty-five crossbred (Japanese Black X Holstein) steers transported to a farm at 6-10 mo of age were managed under pen conditions. Each of the three pens (6.0 m X 9.5 m each) consisted of 11-12 steers. Serum and plasma samples from the jugular vein (concentrations of 7 hormones and 5 nutrients), ultrasonic images between the 6th and 7th rib (longissimus muscle area (LMA) and beef marbling score (BMS)), physical measurements (body weight and 10 parts of measurements), temperament scores at 5 different handling conditions, and behavioral observations using the instantaneous sampling with 10-min intervals for 2 h after morning and evening feedings (17 behavioral categories) were collected 1, 3, 5 mo after their entry into the farm. The average daily gain (ADG) and increase in LMA (ILMA) were also determined. A factor analysis with principal components and orthogonal varimax rotation determined 8 common clusters of measurements. As for growth-related measurements, ADG, the body weight 1 mo later, chest width, and the frequency of investigative behavior constituted a cluster. ILMA clustered with triglyceride and total cholesterol concentrations, LMA 1 mo later, and temperament scores at blood sampling and ultrasonic recording. ADG was not correlated with ILMA. BMS, leptin concentrations, thurl width, and the frequencies of lying and eating hay clustered together. Vitamin A concentrations entered a cluster of cathecholamine and cortisol concentrations, the frequency of grooming with pen facilities, entry order into the crush, and a temperament score on the scales. Vitamin A concentrations also tended to be correlated with insulin ($r = 0.31$, $P = 0.07$) and leptin ($r = 0.27$, $P = 0.12$) concentrations. Vitamin A may play an important role in the hormonal system(s) that regulate stress responses and longissimus muscle growth in the cattle.

Key Words: Beef cattle, Growth, Hormonal system

W47 Parameters for a refined model of ruminant growth and composition. J. W. Oltjen*[1], A. B. Pleasants[2], T. K. Soboleva[2], and V. H. Oddy[3], [1]*University of California, Davis, California,* [2]*Ag Research, Hamilton, New Zealand,* [3]*Meat and Livestock Australia, Sydney, Australia.*

We have refined the prediction system for ruminant animal growth and composition developed previously (Oltjen et al., 2000, Modelling Nutrient Utilization in Farm Animals, pp. 197-209, CABI Publishing, New York). The model represents body protein in two pools, viscera (v) and non-viscera (m). Using sheep datasets (Ferrell et al., 1986, Brit.