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

not bred within the state. The poorly conditioned cattle are lower priced and often rejected right from the farm. When farmers decide to market such animals, they often can not withstand the rigours associated with cattle transportation and handling and usually are dead before reaching the market. This study provides a means by which cattle from different farms under differing management systems can be quickly and cheaply appraised and assessed.

Key Words: Condition Scoring, Zebu, Nigeria

1842   Safety of moxidectin 1% nonaqueous injectable solution for cattle. K.L. Simkins*, R.L. DeLay, and T.W.J. Olchowy, *Fort Dodge Animal Health, Princeton, NJ.*.

Moxidectin is used in cattle for controlling internal and external parasites. The objective of this study was to evaluate the safety of moxidectin 1% nonaqueous injectable solution administered subcutaneously to crossbred cattle (244 to 298 kg BW) at dosages of 0.2, 0.6 or 1.0 mg moxidectin/kg BW (1X, 3X or 5X the expected use level) given 3 times with 7 day intervals. There were 4 steers and 4 heifers in each of the following groups: A (saline control), B (1X), C (3X) and D (5X). Physical exams were conducted before and after treatment. All animals were observed daily for clinical signs following treatments. Hematology, serum chemistry, urinalysis and fecal analysis were conducted at 3 and 1 days prior to treatment and at 6 days after each treatment. All animals were necropsied 7 to 10 days after the third treatment and examined for gross pathology. Histopathology was conducted on approximately 40 tissues for each animal in Groups A and D. Physical exams showed no treatment related abnormalities. There were no apparent adverse clinical reactions following treatment. Hematology results showed that none of the treated groups were different from controls (P>.10) for red blood cell counts, hematocrit, platelets and activated partial thromboplastin time. Hemoglobin concentration for Group D was lower than Group A (10.04 vs 10.42 g/dL, P<.10). White blood cell counts for Groups C and D were higher than controls (P<.10). However, all hemoglobin and WBC counts were within normal ranges. Serum chemistry results showed that none of the treated groups were different from controls (P>.10) for glucose, phosphorus, sodium, chloride, potassium, total protein and total bilirubin. Serum iron was lower in all treated groups compared to controls (P<.10), but all iron concentrations were within normal ranges. Urine, feces, gross pathology and histopathology evaluations showed no treatment related abnormalities. The results of this study show that moxidectin 1% nonaqueous injectable solution is safe for cattle following administration of the expected use level of 0.2 mg moxidectin/kg BW or 3X and 5X this level at weekly intervals for 3 consecutive weeks.

Key Words: Moxidectin, Cattle, Safety

1843   Effect of supplemental energy source on growth and reproductive performance of virgin heifers consuming corn silage diets. C.M. Howlett*, E.S. Vanzant, L.H. Anderson, W.R. Burris, J. Randolph, and R.F. Bapst, *University of Kentucky*.

Ninety-six crossbred, virgin beef heifers (249 kg) were used in a randomized complete block design to determine the effects of source of supplemental nutrients on average daily gain (ADG) and reproductive performance. Heifers were randomly assigned within each of three weight blocks to 4 pens of 8 heifers each. The four pens within each block were assigned at random to one of four diets based on corn silage (CP=8.2%, TDN=63.5%) at 42% DMI with minerals supplied at 2% DMI. Treatments were: 1) corn and soybean meal (CSBM) at 56% DMI; 2) whole linted cottonseed at 15% DMI (COT); 3) whole raw soybeans at 15% DMI (SB); or 4) pelleted soyhulls at 30% DMI (SH). In diets 2 through 4, COT, SB, and SH replaced a portion of the corn and soybean meal. Diets were formulated to be isonitrogenous (13.7% CP) and were fed at approximately 2.2 X NEm to achieve target weights equal to 65% of expected mature body weight at the time of AI. Animals were weighed every 28 d for 112 d with weights obtained on two consecutive days at the beginning and end of the treatment period. After each weighing, feeding levels were adjusted for each pen to account for weight gain. Beginning on d 113, treatments were discontinued and all groups were fed a common diet at an appropriate level to maintain target gains. Serum was obtained for progesterone analysis on days 112 and 119. Heifers were considered to have initiated estrous cycles if progesterone concentrations exceeded .5 ng/ml in either sample. Heifers were synchronized with an MGA/PG system and bred by AI in response to detected heat on days

154 to 156 (beginning 48 h after PG administration). Since the energy value for SH was underestimated, cumulative ADG for SH (1.02 kg/d) was greater (P≤.03) than for CSBM (.88 kg/d), COT (.87 kg/d), or SB (.86 kg/d). Number of estrous cycling heifers prior to synchronization for each treatment were: CSBM (n=13, 54%), COT (n=12, 50%), SB (n=16, 66%), SH (n=16, 66%). First-service conception rates were unaffected (P>.10) by treatment: CSBM 7:19 (37%); COT 8:21 (38%); SB 12:22 (55%); SH 8:19 (42%). Numerical trends suggest that SB may increase reproductive performance independent of energy supply in virgin heifers consuming a corn silage based diet.

Key Words: Energy, Supplementation, Conception

1844   Influence of Estrus Synchronization on Reproductive Performance of Cows Exposed to Natural Service. J. D. Rhinehart*, J. W. Wyles, and L. H. Anderson, *University of Kentucky*.

We tested the hypothesis that estrus synchronization would affect the interval to pregnancy and pregnancy rate in postpartum cows. In this experiment, crossbred postpartum cows (n = 84) and two-year-old heifers (n = 24) were randomly assigned to one of three treatments and balanced by age and calving date. The treatments consisted of 1) exposure to orally active melengestrol acetate (MGA, 5 mg/head/day as a top-dressed supplement to the basal diet) from D -7 to D -1 (D 0= first day of breeding season); 2) seven days of MGA exposure with administration of 25 mg of prostaglandin F2α (Lutalyse, Pharmacia & UpJon, Kalmazoo, MI) on D -1 (MGA+PG); or 3) fed only the basal diet (CONT). On D 0, each group was exposed to natural service for 60 days (1 yearling bull per eight females). All bulls were subjected to, and passed, breeding soundness exams on D -30. Date of pregnancy was determined using rectal palpation on D 140. Pregnancy rates differed (P = .08) among cows in the CONT (86%), MGA (92%), and MGA+PG (100%) groups. Interval to pregnancy (number of days from onset of the breeding season to conception) was lower (P < .05) for cows in which estrus was synchronized (MGA, MGA+PG) than for cows which were not (CONT). Interval to pregnancy tended (P = .13) to differ between cows in MGA and MGA+PG groups. From these results we concluded that estrus synchronization, prior to natural service, improved reproductive performance in postpartum cows.

Key Words: Estrus Synchronization, MGA, Natural Service

1845   Influence of calving on body condition score in crossbred cows. Sarjan rao Kapa*[1], Dilipkumar Garikipati[1], and Kailash MM[2], [1]*College of veterinary science, Tirupati, Angrau,* [2]*University of Agricultural science, Bangalore*.

A five-point body condition score technique based on visual, tactile or combined assessment of the amount of body condition carried by the cow was employed on 216 crossbred HF cows to study the postpartum changes in BCS. The BCS observed for all the first calvings and all other (2 through 4) calvings were 3.18±0.39 and 3.52±0.54, respectively. The BCS at 60 days, 120 days and loss at 120 days of all lactations were 3.12±0.79, 3.06±0.68 and 0.87±0.62, respectively were observed. The body condition loss ranged from 0.50 to 1.09 over the BCS range of 2.5 to 4.5 with an average of 0.27 points increase for every one unit higher initial BCS. The magnitude of condition loss depended primarily on score at calving and was greater for cows that calved with high BCS. After reaching the minimum score, cows gained the range of BCS from 0.18 to 0.27 and with an average gain of 0.04 points for every increase of one unit of BCS. The total amount of gain was mainly influenced by BCS at calving and by milk yield. The loss in BCS was low in comparison with gain in BCS. A quadratic relationship (P<0.0001) existed between lactation number and BCS at calving with FCM production to 90 days in milk (DIM). The change in BCS from calving to 60 days vs 90 days FCM production was quadratically (P<0.0001) related to lactation number which showed that lactation number accounted for most of variation in milk production. The BCS varied quadratically with days in milk and month in milk within each lactation. Mean BCS for 30 days lactation was significantly (P< 0.05) different at 241 to 270 days and (P<0.01) at 90 to 120 days. All other 30 days of milk intervals and dry periods were not significantly different from respective adjacent 30 days lactation intervals. There was a significant difference in BCS between early dry cows and late dry cows.

Key Words: Body Condition Score, Days in Milk, Fat-corrected Milk

1846   Maternal performance of four biological types of Red Poll cows.   B.A. Sandelin*[1], A.H. Brown, Jr.[1], Z.B. Johnson[1], A.M. Stelzleni[1], and C.F. Rosenkrans, Jr.[1], [1]*University of Arkansas.*

Maternal performance of four biological types of Red Poll cows born, reared and managed on Ozark Mountain range were evaluated. Growth curve parameters of mature weight (A) and maturing rate (k) were estimated for 59 Red Poll cows using the Brody Model. Cows were assigned to one of four biological types: large late maturing (LL, A > 455 kg, k < 0.0500%), large early maturing (LE, A > 455 kg, k > 0.0500%), small late maturing (SL, A < 455 kg, k < 0.0500%), and small early maturing (SE, A < 455 kg, k > 0.0500%). Weights for calves were recorded at birth, 120, 240, and 360 d. Distribution of calf weights by biological cow type included: LL (n = 99), LE (n = 37), SL (n = 24), and SE (n = 85). Age and age of dam adjusted calf weights were analyzed using a model that included terms for an overall mean, year, type, sire, sex, interactions of type x year and type x sex, and residual error. Year, type, and sex were considered fixed effects and sire was considered a random effect. Year x type interactions were significant for weight at all ages, but sex x type interactions for weight were not significant at any age. Calves born to the four biological cow types had similar (P > 0.05) mean birth and 360 d weights. Small, early maturing cows had calves with smaller (P < 0.05) mean 120 d weights than calves of other biological types (135 5 vs 145 4, 147 5, 148 6 kg). Large and small, late maturing cows and LE cows produced calves with similar (P > 0.05) mean 240 d weights (217 4, 215 6, and 211 6 kg) and their calves were heavier (P < 0.05) than those of SE cows (197 4 kg). However, there was no difference (P > 0.05) in the 240 d weights between the LE and SE cow types. Mean weaning rates for LL, LE, SL, and SE cows were 85 5, 82 7, 76 8, and 83 4 %, respectively. These data suggest that size and maturing rate of Red Poll cows managed with limited resources, influences preweaning calf performance, but may not affect weaning rate.

Key Words: Mature weight, Maturing rate, maternal performance

ASAS Goat Species and ASAS Companion Animal Species

1847   Evaluation of Corn Gluten Meal as a Protein Source in Canine Diets.   R.M. Yamka*[1], S.E. Kitts[1], A.D. True[1], D.L. Harmon[1], and W.D. Schoenherr[2], [1]*Dept. of Animal Sciences, University of Kentucky, Lexington, 40546,* [2]*Hill's Pet Nutrition, Topeka, KS 66617.*

Ten mature dogs (19.0 kg + 0.4 kg) surgically fitted with ileal T-cannula were used in an experiment to determine the feeding value of corn gluten meal (CGM) in a complete diet fed to dogs. All diets contained 10% poultry meal and graded levels of CGM (0 to 32% DM) resulting in diets that were 10, 15, 20, 25 and 30% crude protein. Daily dry matter (DM) intake averaged 307 + 7 g/d. An increase in CGM resulted in an increase in fecal moisture from 51.6 to 57.5% (linear; P < 0.0001) and fecal DM output increased from 24.2 to 32.9 g/d (linear; P < 0.0001). Ileal DM flow increased from 34.8 to 51.3 g/d (linear; P< 0.0004). Small intestinal DM digestibility decreased from 88.9 to 83.4% (linear; P < 0.0002) and total tract DM digestibility decreased from 92.3 to 89.4% (linear; P < 0.0001) as CGM increased. Large intestinal digestibility (29.4% DM) was not affected by treatment. Crude protein (CP) fecal excretion increased from 5.6 to 8.1 g/d (linear; P < 0.0004) and ileal flow of CP increased from 9.4 to 16.9 g/d (linear; P < 0.002) as CGM increased. Small intestinal CP digestibility increased from 73.4 to 82.5% (linear; P < 0.002) with increasing CGM. Large intestinal CP digestibility was not affected by treatment (40.4% DM). Total tract CP digestibility increased from 84.5 to 91.1% (linear; P < 0.0001) as CGM increased. Disappearance of all amino acids (g/d) increased (linear; P < 0.0001) with increasing CGM. Glutamate had the highest disappearance ranging from 3.83 to 16.16 g/d. Histidine had the lowest disappearance ranging from 0.49 to 1.41 g/d. Arginine had the highest overall digestibility ranging from 86.2 to 87.6% whereas, threonine had the lowest digestibility ranging from 64.7 to 75.1%. These data indicate that CGM is a highly digestible protein source for canine diets with dietary inclusions of 8.4 to 32.2%.

Key Words: Corn Gluten Meal, Amino Acid, Canine

1848   The effects of an antioxidant system based on tocopherols and novel extracts from Rosemary on petfood shelf-life and acceptability by dogs and cats.   C. G. Aldrich* and J. O. Mann, *Kemin Americas, Inc., Des Moines, IA.*

A study was conducted to determine the shelf life and palatability of extruded petfood stabilized with tocopherols and novel extracts from rosemary. The treatments included a negative control in which fat was not treated with an antioxidant, a positive control in which fat was treated with Naturox[TM] at 3000ppm, and fat treated with an experimental formula, RX13, at 3000 ppm. Naturox[TM] is a tocopherol-based antioxidant system, whereas RX13 is a blend of tocopherols and the novel extract of purpose-bred rosemary. Equal portions of fat were applied internally and externally during processing in an Extru-Tech E525 extruder run at a rate of 800 lb/hr. Diets consisted of corn (49.5%), chicken by-product meal (30%), chicken fat (10%), beet pulp (4%), egg (3%) and yeast (3%), as well as, minerals and vitamins to 100%. Processing conditions remained constant for the test runs. In the oxygen bomb analysis, an accelerated shelf-life method, an induction time of 3.85 h was recorded for the negative control. This compared to 6.75 h for the positive control; petfood that contained tocopherol-based Naturox[TM]. The experimental formula, RX13, had an 11.2% longer predicted shelf-life than the positive control with an induction time of 7.60 h. Crude extracts of rosemary contain compounds that impart a distinctive aroma to which dogs and cats have an aversion. It is necessary to remove these volatile compounds through the use of rolled-film evaporation. To verify that the negative aromas were removed, the Naturox[TM] and RX13 diets were fed to 20 Beagle dogs and 20 American Shorthair cats in a 4 day split-plate palatability test. In dogs, first bite, a reflection of aroma, was not affected by treatment (1.00:1.11). Likewise, total consumption, an indication of flavor, was not different (1.30:1.00). In cats, a similar result was observed in that first bite was similar between treatments (1.59:1.00), as was total consumption (1.34:1.00). It was concluded from this study that the novel extract of purpose-bred rosemary and its subsequent deodorization was an effective component of an antioxidant system for the stabilization of fat in extruded pet foods.

Key Words: Rosemary extract, Shelf-life, Palatability

1849   The effect of hay and /or concentrate on performance, organ mass, blood metabolites and hormones in weaned kids.   B. Kouakou*, S. Gelaye, G. Kannan, T. H. Terrill, E. A. Amoah, and S. Miller, *Agricultural Research Station, Fort Valley State University.*

Weaned kids (BW = 12 .6 kg; n = 12) were used in an experiment to determine the effect of hay, concentrate, or concentrate following hay feeding on performance, organ mass, thyroid hormones and blood metabolites. Kids were stratified by BW and randomly assigned to dietary regimen. Chopped rhizoma peanut (*Arachis glabrata*) hay or an 18 % CP concentrate diet were fed during the two periods of 60 d each. During the first period, two groups of kids (n = 4; total = 8) were fed hay alone, and one group (n = 4), the concentrate diet. During the second period, one of the hay-fed groups (n = 4) was switched to the concentrate, while the other groups remained on the previous diets (hay, n = 4; concentrate, n = 4). Dietary treatments were identified as HH (Hay, Hay), HC (Hay, Concentrate) and CC (Concentrate, Concentrate) to indicate hay or concentrate for first and second period, respectively. Weights, feed and blood samples were taken every 20 d. At the end of the second period (120 d), all animals were slaughtered and digestive tract (reticulo-rumen and intestines including digesta), liver and hot carcass weight were recorded. Blood samples were analyzed for BUN, NEFA, glucose, T_4 and T_3. In period one, T_4 and T_3 were higher (P < .05 and P < .01, respectively), BUN and NEFA were lower (24.9 vs 33.4 mg/dL and 159.9 vs 271.8 mEq/L, respectively) in concentrate-fed than in those fed hay. Glucose levels were similar (57.8 mg/dL) for hay or concentrate-fed kids but BW gain was greater (P < .01) for concentrate-fed than for hay-fed animals . During period two, gain was similar (3.25 vs 4.25 kg for HC and CC animals, respectively) and T_3 was highest (P < .01) in HC followed by CC and HH animals. Both groups of animals fed concentrate in period two had lower (P < .05) levels of NEFA (483 and 415.6 vs 1264 mEq/L) and higher levels of glucose (69.9 and 53.6 vs 43.5 mg/dL) than those fed hay. Overall gain was highest (P < .01) for CC (11 kg)followed by HC (5.5 kg)and HH (1 kg) animals. Liver