the onset of protein secretion, increases estrogen secretion by the conceptus, increases the size of the fetus in later pregnancy, and decreases litter size. Studies of fetal erythropoiesis also indicate that specific uterine products (uteroferrin, folate binding protein) are required for this important aspect of fetal development and that greater litter size is associated with improved erythropoiesis. Thus, manipulation of uterine function can modify conceptus development and impact pregnancy success in domestic livestock.

Key Words: Pregnancy, Uterus, Conceptus

955 Role of placental function in mediating conceptus growth and survival. M. E. Wilson*, *West Virginia University*.

Conceptus mortality is a significant factor limiting reproductive efficiency of livestock. In both singlet (i.e., cattle) and litter (i.e., pigs and sheep) bearing species, investigations of conceptus mortality have traditionally focused on the period immediately preceeding and throughout the attachment phase, around the time of maternal recognition of pregnancy. Recently, data has emerged leading to the suggestion that conceptus loss later in gestation is also significant and that variation in placental size and function may play a very important part in determining whether or not a conceptus survives. In the pig, the number of conceptuses present after the initial period of loss that survive to term appears to be influenced by the total amount of placental mass present, such that litters containing individuals with relatively small placentae have a greater potential for a large litter size when compared to litters containing similar numbers of individuals with relatively large placentae. In ruminants, recent evidence supports the time of placental development and initial vascularization (between d 28 and 40) as a second period of significant loss, particularly in situations involving manipulation (ovulation synchronization for timed AI in cattle and out-of-season breeding in sheep). In the pig, not only does placental size vary, but the efficiency (as measured by the fetal wt to placental wt ratio) can vary as much as 3-fold within a litter, leading to the suggestion that selection for small very efficient placentae may provide a mechanism for increasing litter size. In ruminants, there are obvious cases where placental growth has been markedly altered (i.e., large offspring syndrome or heat stress) and a subsequent deviation from 'normal' placental efficiency occurs. Less information is available on normal variation in placental size and efficiency; however, the timing of the secondary period of loss supports a role for events during placental development and vascularization being critical to survival and potentially contributing to the observed loss.

Key Words: Conceptus survival, Placental function, Reproductive efficiency

ASAS/ADSA Production, Management, and Environment: Management and Production Practices; Beef (Cow-Calf and Feedlot) and Sheep

956 Factors affecting profitability of the cow-calf enterprise. B.H. Dunn*, R.J. Pruitt, and E.D. Hamilton, *South Dakota State University*.

The cow-calf enterprise (**CCE**) was analyzed for factors affecting profitability with production and financial data from 148 individual CCE enterprises from the states of SD, MT, NE, IA, MN, WY, ND, and KS from 1991-1999. Data were collected at the herd level according to Standardized Performance Analysis (**SPA**) guidelines. SPA financial measurements are reported on a per 100 kg weaned calf (**CALF**), per beginning year breeding female (**FEMALE**), and a per hectare used by the CCE (**HA**). Profit is defined as return on assets (**ROA**). Mean separation was used to describe the relationships between levels of profit and SPA measurements. Enterprises were divided into three profit groups based on ROA. High Profit (**HP**) is defined as those CCE with a ROA $>$ 1 SD above the mean ROA. Low Profit (**LP**) are those CCE with a ROA $<$1 SD below the mean. Medium Profit (**MP**) are CCE with ROA of -6.7 to 12.9%. Of the 23 SPA production measurements used to describe the CCE by size, reproductive performance, and the production of weaned weight, the only variable for which HP enterprises were higher ($P < 0.10$) than MP and LP enterprises was weaning percentage. The weaning percentages were 90.2, 86.6 and 83.4 for HP, MP, and LP. The same was not the case for the comparisons of SPA financial measurements. On a CALF basis, HP had fewer total dollars invested than did MP ($P < 0.05$), lower depreciation expenses ($P < 0.10$), and lower total expenditures ($P < 0.05$) than both MP and LP enterprises. By all three units of measure, HP had lower breakevens ($P < 0.05$), and higher net income and ROA ($P < 0.01$) than MP and LP. Factors affecting ROA were determined with multiple regression. A predictive equation with an R^2 of 0.813 included the independent variables net income, owners equity, pregnancy percentage, and the interaction of net income and owners equity ($P < 0.05$). These analyzes of the CCE indicate that high ROA is not a function of size, but low levels of investment, average levels of weaned weight, high reproduction, high net income, and low total expenditures.

Key Words: Cow-calf, Profit, SPA

957 Characterization of the production and financial performance of the cow-calf enterprise using Standardized Performance Analysis. B.H. Dunn*, E.D. Hamilton, and R.J. Pruitt, *South Dakota State University*.

The cow-calf enterprise (**CCE**) was described with production data from 185 individual CCEs with 148 providing financial data. Data were compiled over nine years (1991-1999) from CCEs located in the states of SD, MT, NE, IA, MN, WY, ND, and KS. Data were collected at the herd level according to the guidelines of Standardized Performance Analysis (**SPA**). The SPA financial measurements are reported on a per 100 kg weaned calf (**CALF**), per beginning year breeding female (**FEMALE**), and a per ha used by the CCE (**HA**). The average CCE consisted of 508 $\pm$ 723 beginning year breeding females and 5,067 $\pm$ 9,106 ha. Hectares per exposed female averaged 9.7 $\pm$ 4.7. The mean beginning Gregorian calving date was 59.4 $\pm$ 26.6. Reproductive performance was measured by mean pregnancy, calving, and weaning percentage which were 93.0 $\pm$ 4.6, 91.4 $\pm$ 7.3 and 86.7 $\pm$ 7.8 respectively. The percentage of calves born from d 1 - 21, 1 - 42, 1 - 63, and calves born after d 63 were 56.8 $\pm$ 5.5, 84.1 $\pm$ 11.6, 96.0 $\pm$ 4.8, 4.0 $\pm$ 4.91. The average herd replacement rate was 19.7 $\pm$ 19.4%. The calves averaged 199.0 $\pm$ 28.0 d at weaning. Mean calf weaning weight, kg of weaned calf per cow exposed, and kg of weaned calf per ha utilized by the CCE was 235.9 $\pm$ 27.3 kg, 205.0 $\pm$ 32.3, and 44.8 $\pm$ 26.7 respectively. The CCEs had an average investment of \$970.97 $\pm$ 664.91, \$2,087 $\pm$ 1473, \$473.79 $\pm$ 435.71 per CALF, FEMALE, and HA respectively. The total annual expenditure was \$189.55 $\pm$ 98.3, \$397 $\pm$ 217, \$82.03 $\pm$ 86.52 per CALF, FEMALE, and HA respectively. Total revenue was \$206.62 $\pm$ 79.60, \$430 $\pm$ 159, \$89.27 $\pm$ 71.25 per CALF, FEMALE, and HA respectively. Net income was \$17.09 $\pm$ 84.17, \$33 $\pm$ 175, and \$16.92 $\pm$ 41.49 CALF, FEMALE, and HA respectively. The mean breakeven was \$154.11 $\pm$ 97.75, 331 $\pm$ 217, and 69.21 $\pm$ 80.20 per CALF, FEMALE, and HA respectively. The mean return on assets was 3.1%. CCEs in this sample were large, productive, required a large capital investment, and had low levels of profitability.

Key Words: Cow-calf, Profit, SPA

958 Management factors affecting selling prices of beef calves. T. R. Troxel*, M. S. Gadberry, S. Cline, J. Foley, G. Ford, D. Urell, and R. Wiedower, *University of Arkansas Cooperative Extension Service, Little Rock, AR*.

The objective of this study was to determine how management factors affected selling price of beef calves. Data were collected from January 1 to December 31, 2000 at seventeen Arkansas livestock auctions. The database consisted of 81,703 head of cattle representing 15.3% of the total calves sold. Information was collected by experienced livestock market news reporters and included body condition, time of sale, castration, horn status, fill, health, and individual or group selling. Each factor was analyzed using GLM procedures using month, weight and nearby feeder cattle future prices as covariates and least-squared means were generated. All prices are based upon dollars per 45.45 kg of live weight. Body condition affected selling price ($P < 0.0001$) with very thin, thin, average, fleshy and fat calves selling for \$85.94, \$96.03, \$93.63, \$91.76 and \$88.94, respectively. The selling price of calves sold during the second third (\$93.90) of the sale was higher ($P < 0.02$) than cattle sold during the first (\$93.64) and third third (\$93.55). Steers sold for \$4.63

more ($P < 0.001$) than bulls and polled calves sold for \$1.49 more ($P < 0.001$) than horned calves. Fill affected selling price ($P < 0.0001$) with gaunt, shrunk, average, full and tanked calves selling for \$97.12, \$95.47, \$93.26, \$88.53, and \$82.16, respectively. Healthy calves sold for \$94.07, which was higher ($P < 0.001$) than dead hair (\$83.37), stale (\$82.49), sick (\$68.27), bad eye(s) (\$81.57) or lame (\$66.67) calves. Calves sold in groups of 2 to 5 head (\$95.14) and groups greater than six (\$94.61) received a higher ($P < 0.04$) selling price than calves sold as individuals (\$93.90). Beef cattle producers can greatly influence the selling prices of their calves through managing calf body condition, castration, horns, fill, health and group selling.

Key Words: Selling price, Beef calves, Auctions

959 Impact of the phenotypic expression of calf genetics on the selling price of beef calves. M. S. Gadberry*, T. R. Troxel, S. Cline, J. Foley, G. Ford, D. Urell, and R. Wiedower, *University of Arkansas Cooperative Extension Service, Little Rock, AR*.

A study was conducted to evaluate the impact of genetic factors on the selling price of beef calves marketed through Arkansas auction barns. Data was collected on 65,743 individually sold calves, marketed through 17 auction barns in y 2000. Data collection was conducted by experienced livestock market news reporters. Information pertaining to the phenotypic expression of calf genetics included subjective identification of breed, color, and USDA frame and muscle scores. Due to the unbalanced nature of the dataset, variables were analyzed individually with month, calf weight, and nearby feeder cattle futures as covariates, and least-square means were generated. All prices are based upon dollars per 45.45 kg of live weight. Breed, color (independent of breed), frame and muscle impacted ($P < 0.01$) feeder calf price. Twenty breed or breed groupings were evaluated. Charolais by Limousin cross calves (\$97.96) brought a higher selling price ($P < 0.001$) than all other breeds whereas Hereford (\$83.37), Brahman (\$80.94), and Longhorn/Longhorn cross calves (\$74.52) were lower in price ($P < 0.001$) compared to other breeds. Yellow-colored calves (\$96.47) brought a higher selling price ($P < 0.001$) compared to all other calf colors. Spotted calves (\$83.84) received the lowest price ($P < 0.001$). Yellow-white face (\$95.65) and black-white face calves (\$95.23) tended to be similar in value ($P = 0.07$), but the price for black-white face calves did not differ from the price of whites (\$94.93; $P = 0.14$). Price due to frame size differed ($P < 0.001$) for all three frame sizes. The selling price for large, medium and small-framed calves was \$94.34, \$93.38, and \$74.81, respectively. Price also differed ($P < 0.001$) for muscle scores 1, 2, and 3 (\$95.02, \$85.35 and \$70.51, respectively). Beef cattle producers can influence the calf-selling price through genetic selection.

Key Words: Feeder calves, Market price, Genetic factors

960 Evaluation of stocking rate and breed type on cattle feedlot production costs and carcass value. J. J. Cleere*[1], A. D. Herring[1], J. W. Holloway[2], H. Lippke[2], C. R. Long[3], F. M. Rouquette[3], and B. G. Warrington[2], [1]*Texas Tech University, Lubbock,* [2]*Texas Agricultural Experiment Station, Uvalde,* [3]*Texas Agricultural Experiment Station, Overton*.

Spring born steers (n = 89) and heifers (n = 36) were assigned to two stocking rates in December 1999 at the Texas Agricultural Experiment Stations in Overton (OVT) and Uvalde (UVL) to create different growth rates. Animals were either 100% Angus (A) or Angus cross (AC) at UVL and were either 75% Angus (A75), 50% Angus (A50) or Brahman (B) at OVT. UVL animals and the OVT B animals were steers, whereas the OVT A75 and A50 were a combination of heifers and steers. Animals grazed TAM 90 (RG) annual ryegrass (*Lolium multiflorum*) in UVL at 2.5 to 4.0 animals/ha (LO) or 4.2 to 6.7 animals/ha (HI). Calves grazed 'Maton' rye (*Secale cereale*) and (RG) in OVT at 3.0 animals/ha (LO) or 6.2 animals/ha (HI). Cattle were placed at the Texas Tech Alltech Research feedlot in May 2000 to determine the influence of stocking rate (SR) and breed type (BT) on feedlot performance and carcass traits. Cattle were randomly assigned to pens by LOC, BT, SR, sex and weight with 4 to 7 animals per pen. Traits on cattle from OVT and UVL were analyzed separately with pen as the experimental unit for all analyses. The statistical model for the UVL cattle included SR, BT and initial feedlot weight as a covariate, whereas the model for the OVT cattle included the same variables plus sex and BT x SR. Among the OVT cattle, SR did not affect carcass value (CARC), feed cost of gain (COG), daily DMI or average daily gain (ADG) ($P > .05$). SR did not affect CARC, COG or ADG among the UVL animals ($P > .05$). However, the HI animals had a higher daily DMI (9.57 ± .12 kg) than the LO animals (9.16 ± .18 kg) ($P < .10$). BT did not affect CARC, COG or ADG among the OVT animals ($P > .05$). However, the B cattle consumed less feed (7.49 ± .39 kg/d) in comparison to the A50 (10.28 ± .20 kg/d) and the A75 (11.14 ± .38 kg/d) ($P < .05$). There was also a potential BT x SR interaction among the OVT animals for daily DMI ($P = .11$). Among the UVL animals, BT did not affect CARC, COG, or ADG ($P > .05$). The A animals had a higher DMI (9.81 ± .10 kg) than the AC animals (8.92 ± .21 kg) ($P < .05$). Previous management should be considered in marketing feedlot cattle.

Key Words: Beef cattle, Feedlot costs, Carcass value

961 Phenotypic relationships between serial ultrasound measures of body composition in commercial beef feedlot animals determined with a random regression model. T.L. Fernandes*[1], S.P. Miller[1], and C.J.B. Devitt[2], [1]*University of Guelph, Guelph, Ontario, Canada,* [2]*Beef Improvement Ontario, Guelph, Ontario, Canada*.

Objective was to determine the relationship between serial ultrasound measurements within an animal (rib-eye area-REA, backfat-BF, and intra-muscular fat-IMF) in relation to body weights and days on feed. Serial ultrasound measurements were obtained from 165 feedlot cattle in Ontario over 7 months (from entry into the feedlot until slaughter). Number of scans per animal ranged from 3 to 6. For each animal, univariate, random linear regressions of REA, BF and IMF on body weight (261-708 kg) or days on feed (30-205 days) were fit. (Co)variance components for intercept, slope and residual were estimated by Restricted Maximum Liklihood (REML), implementing an average information algorithm in the Statistical package ASreml. The estimated covariance function was expanded to determine the (co)variance between any weight or days within the recorded range. For regression on weight, correlations of ultrasound measures within animal ranged from 0.26-0.55, 0.29-0.94, and 0.24-0.75 for REA, BF, and IMF respectively, between measures at 50kg intervals and measure at 600 kg. For regression on days on feed, correlations between measures within an animal ranged from 0.42-0.55, 0.69-0.92, and 0.46-0.66 for measures at 30-day intervals, with 120 days on feed for REA, BF, and IMF, respectively. (Co)variances estimated form a basis for further studies investigating predictions of carcass merit with early ultrasound measures.

Key Words: Cattle, Ultrasound, Predictions

962 Effect of different implant regimes on the accuracy of ultrasound for prediction of body composition characteristics in beef cattle. T.L. Perkins and B.L. Frieden*, *Southwest Missouri State University*.

The objective of this study was to examine the effect of different implant regimes on the accuracy of ultrasound for the estimation of body composition characteristics in beef cattle. Ultrasonic measurements of longissimus muscle area (LMAU), 12th-rib fat thickness (FTU), and percent intramuscular fat (PFATU) were taken by one technician. Cattle were harvested at 110 d (n=21), 141 d (n=3), 160 d (n=25), 180 d (n-=23), 201 d (n=25), 208 d (n=20) and 258 d (n=24) after being scanned. Carcass measurements included: hot carcass weight (HCW), longissimus muscle area (LMAC), fat thickness at the 12th rib (FTC), preliminary yield grade (PYG), kidney, pelvic, and heart fat (KPH), marbling score (MS), final yield grade (YG), and final quality grade (QG). All crossbred steers (n =141) were scanned ultrasonically and implanted on the same day. One of four implant regimes were administered in a completely randomized design as follows: control (n=36) with no implant (TRT1) ; Ralgro® (n=31) (zeranol, 36 mg; Schering-Plough, Union, NJ) (TRT2); Revalor® (n=35) (24 mg estradiol, 120 mg trenbolone acetate; Hoechst Roussel Vet., Warren, NJ) (TRT3); and double Revalor® (n=39) (TRT4) implant. Means by treatment for FTC, REAC, MS, FTU, LMAU, PFATU, and HCW were 1.05 cm, 94.29 cm2, 5.3, .65 cm, 65 cm2, 3.6% (TRT1); 1.09 cm, 93.69 cm2, 5.2, .57 cm, 64 cm2, 3.4% (TRT2); 1.02 cm, 94.63 cm2, 5.1, .49 cm, 63 cm2, 3.3% (TRT3); .84 cm, 96.83 cm2, 5.0, .53 cm, 63.2 cm2, 3.3% (TRT1) respectively. Correlations between FTU and FTC by treatment were .71; .73; .60; and .61 for each implant regime. Correlations between LMAU and LMAC by treatment were .40; .57; .43 and .58 for each implant regime. Correlations between PFATU and MS by treatment were .27; -.08; .47;

and .37 for each implant regime. These data suggest that ultrasound accuracy was affected by different implant regimes. Implant treatment affected accuracy of fat prediction less than it did accuracy of muscle area or marbling.

Key Words: Ultrasound, Implant, Accuracy

963 Effects of anabolic implants on intramuscular lipid deposition. K. R. Smith*[1], J. R. Sackmann[1], S. K. Duckett[1], and T. D. Pringle[1], [1]*University of Georgia, Athens, GA*.

Ten Angus heifers (386 kg) sired by high marbling EPD bulls were used in a 108 d finishing trial to determine effects of anabolic implants on i.m. lipid deposition. Five randomly selected heifers were implanted with Synovex-Plus (SP; 28 mg estradiol benzoate containing 200 mg of trenbolone acetate) at d 0 and 55. The remaining five heifers were not implanted and served as controls (N). Real-time ultrasound measurements of ribeye area (UREA), fat thickness (UFT) and intramuscular lipid (UIMF) percentage were recorded at 28 d intervals throughout the finishing period. At 108 d, all heifers were harvested and carcass data recorded. One steak (2.54 cm thick) was removed from the 12/13th rib, trimmed of all subcutaneous fat and connective tissue, and pulverized in liquid nitrogen to obtain total lipid content. Ultrasound and performance data were analyzed using the GLM procedure of SAS with time, treatment and two-way interaction in the model. Carcass and lipid data were analyzed using GLM with treatment in the model. Average daily gain was 36% greater ($P < 0.01$) for SP than N. UREA increased ($P < 0.05$) over time for both treatments; however, SP increased at a faster rate than N (0.31 vs 0.23 cm^2/d). UFT and UIMF increased ($P < 0.001$) across time-on-feed but were similar between treatments. Implantation altered ($P < 0.06$) the magnitude of change in UIMF over time during finishing, with 82% of the total UIMF deposited between d 27 to 55 in SP and 48% of the total UIMF deposited between d 55 to 80 in N. Final live weight and hot carcass weight were 11% greater ($P < 0.07$) for SP than N. Ribeye area was larger ($P < 0.01$) by 23% for SP than N. SP had 10% greater ($P < 0.05$) overall maturity scores than N. Other carcass measures including marbling score and quality grade were similar ($P > 0.05$) between treatments. Total lipid content of the longissimus was similar ($P > 0.05$) between SP and N. Use of anabolic implants in heifers with the genetic potential to marble did not alter ultimate i.m. lipid content of longissimus; however, pattern of i.m. lipid deposition was altered by implantation.

Key Words: Beef, Implant, Lipid

964 Effects of Implants on Growth Performance of Steers Wintered on Dormant Native Tallgrass Prairie, Subsequent Performance, and Carcass Merit. G.W. Horn*, C.J. Ackerman, S.I. Paisley, and B.A. Gardner, *Oklahoma Agricultural Experiment Station, Stillwater, OK/USA*.

Three hundred, twenty fall-weaned crossbred steer calves (214 ± 21.9 kg) received either no implant (Control), or were implanted with Synovex-C® (**SC** = 10 mg estradiol benzoate + 100 mg progesterone), Synovex-S® (**SS** = 20 mg estradiol benzoate + 200 mg progesterone), or Revalor-G® (**RG** = 8 mg estradiol-17β + 40 mg trenbolone acetate) to determine the effects of implants on weight gain during winter grazing on dormant tallgrass prairie, subsequent grazing and finishing performance, and carcass merit. Steers grazed two dormant tallgrass prairie pastures from October 23, 1998 until April 5, 1999 (164 d) and received 1.82 kg/d of a cottonseed meal and wheat middling-based 20% CP supplement. Following winter grazing, all steers were implanted with Ralgro® (36 mg zeranol) and grazed a common tallgrass prairie pasture until July 15 (101 d). After summer grazing, all steers were implanted with Revalor-S® (24 mg estradiol-17β + 120 mg trenbolone acetate) and winter implant treatment groups were equally allotted to two pens in a commercial feedlot. Steers were harvested November 19, 1999 after a 127 d finishing period. Data were analyzed by least squares analysis, and treatment sums of squares were separated using nonorthogonal contrasts that compared Control vs implanted, RG vs SC (i.e., similar amounts of estrogenic activity), and RG vs SS. Mean daily gains (kg) of all cattle during the winter, summer, and feedlot phases were $0.16 \pm .009$, $1.05 \pm .016$, and $1.62 \pm .029$, respectively, and were not influence by implanting. Steers implanted during the wintering phase had increased *($P<0.05$)* skeletal maturities. "B" maturity carcasses were increased 5.1, 8.8, and 2.4 percentage units by SC, SS, and RG implants. This is consistent with our previously reported results, and brings to question the efficacy of continuous use of growth-promoting implants in coordinated beef cattle production systems and effects on carcass value.

Key Words: Growing Steers, Implants, Carcass Merit

965 Effect of Feed Intake Restriction on Animal Performance and Carcass Characteristics. C.D. Drager*, M.S. Brown, M. Jeter, P. Dew, and E. Cochran, *West Texas A&M University*.

An experiment was conducted to study the effect of the severity of DMI restriction on performance and carcass characteristics of feedlot cattle. Crossbred steers (n = 256, 311 +/- 1.6 kg initial BW) were block by BW, randomly assigned to one of four treatments (28 pens, 7 pens/treatment), and fed a common 90% concentrate diet. Treatments were: 1) 75% of DMI of steers allowed ad libitum access (AL) for 65 d, 95% of AL for 65 d, and AL for 21d (AL85); 2) 80% of AL for 65 d, 100% of AL for 65 d, and AL for 21 d (AL90); 3) 85% of AL for 65 d, 105% of AL for 65 d, and AL for 21d (AL95), and 4) AL for 151 d (AL100). Feed was offered at approximately 110% of appetite for steers allowed ad libitum access. Feed refused was weighed, and ingredient and diet DM were determined weekly. Feed was offered for AL85, AL90, AL95 based on DMI by AL100 the previous week. All steers were fed a similar quantity of DM for 3 d prior to initial, interim, and final BW determination. Overall DMI was increased ($P < 0.01$) for AL100 compared to the average of restricted steers and increased linearly ($P < 0.01$) with increasing DMI of restricted steers (8.92, 9.13, 9.36, 9.74 +/- 0.08 kg/d for AL85, AL90, AL95, and AL100, respectively). Overall ADG (carcass-adjusted) was decreased ($P < 0.01$) for restricted steers compared to AL100 (1.46, 1.60, 1.57, 1.67 +/- 0.03 kg/d). Overall ADG and ADG:DMI (carcass-adjusted) responded quadratically ($P < 0.04$) with increasing DMI of restricted steers. Hot carcass weight, ribeye area, and kidney, pelvic, and heart fat percentage were increased ($P < 0.03$) for AL100 compared to restricted steers, and responded quadratically ($P < 0.07$) with increasing DMI of restricted steers. The number of carcasses grading Choice, Select, $\geq$ low Choice, or Select + Standard did not differ ($P > 0.14$). The severity of restriction and pattern of increasing feed intake resulted in 17, 12.7, and 8 kg/steer less total DM consumed, decreased average daily gain, and decreased gross carcass value an average of $25 for restricted steers.

Key Words: Feed Restriction, Caloric Restriction, Feedlot Cattle

966 Feedlot performance and carcass characteristics of Mashona-sired steers. G. C. Duff*, D. A. Walker, K. J. Malcolm-Callis, J. E. Sawyer, J. Weaver, and M. G. Thomas, *Clayton Livestock Research Center, New Mexico State University, Clayton*.

Seventy-one Mashona (Sanga-type cattle indigenous to Zimbabwe)-sired Brangus or Angus crossed steers (191 kg initial BW) were used to evaluate CP concentration (phase 1; 84 d) and protein source (phase 2; 126 d) on finishing performance and carcass characteristics. During phase 1, treatments were no added CP (3 pens; 12 steers/pen) or a diet containing 14% CP (DM basis; 3 pens; 11 or 12 steers/pen). Steers fed 14% CP diets had greater ($P < 0.01$) ADG, daily DMI, and gain:feed (G:F) than steers fed diets with no added CP during the first 84-d. After 84-d, steers fed diets with no added CP during phase 1 were allotted to 14% CP treatment diets (two pens/treatment; nine steers/pen) containing either soybean meal (SBM) or urea as CP sources; steers fed 14% CP in phase 1 served as controls (diets contained 4.5% SBM and 1% urea). During the final 126 d finishing phase ADG was greater ($P < 0.01$), daily DMI was decreased ($P < 0.05$) and G:F was increased ($P < 0.01$) for the average of SBM and urea diets vs controls. Likewise, final BW was increased ($P < 0.01$) for controls vs the average of SBM and urea diets (490, 462, and 468 kg for controls, SBM, and urea diets). No differences ($P > 0.10$) in performance were detected between SBM or urea as CP sources. Hot carcass wt (303.6, 282.4, and 284.6 kg) and longissimus muscle area (76.7, 72.2, and 72.9 cm^2 for control, SBM, and urea diets, respectively) were increased ($P < 0.05$) for controls relative to the average of SBM and urea diets. Dressing percent (62.0, 61.3, 61.0), marbling score (53.7, 48.7, 51.7), fat thickness (1.36, 1.11, 1.12 cm), internal fat (2.1, 2.1, 2.0) and percentage carcasses grading choice + prime (88.6, 88.2, 94.4% for controls, SBM, and urea, respectively) did not differ ($P > 0.10$) between treatments. Results suggest that Mashona-sired steers perform best with 14% CP concentrations typical of commercial feedlot

diets. Likewise, either SBM or urea can be fed to Mashona-sired steers after feeding low CP diets.

Key Words: Mashona, Performance, Carcass Characteristics

967 Effect of two weaning systems on milk composition, storage, and ejection in dairy ewes. B. C. McKusick*[1], Y. M. Berger[1], P. G. Marnet[2], and D. L. Thomas[1], [1]*University of Wisconsin-Madison, Madison, WI,* [2]*Institut National de la Recherche Agronomique, Rennes, France.*

In small dairy ruminants, a mixed weaning system (MIX) of suckling and machine milking is commonly used during the first 30 d of lactation. The main disadvantage of the MIX system is the markedly low fat content in the machine milk. We hypothesize that the inhibition of milk ejection during machine milking along with alteration in storage of milk fat between milkings is responsible. Twenty-six East Friesian crossbred dairy ewes were used to study the effects of two weaning systems on milk composition, storage, and ejection during the first 4 wk of lactation. At parturition, ewes were randomly assigned to two weaning system groups: no suckling and exclusive twice daily machine milking (DY1, n = 10), or the MIX system of once daily machine milking in the morning and then suckling for 10 hr per day (n = 16). Ewes were injected with saline (control), oxytocin (OT), or an oxytocin-receptor blocking agent (AT) prior to a morning milking once weekly, and machine milk was sampled to evaluate milk storage within the udder. Milk and milk protein yields (1.15 ± .10 kg and 58.4 ± 4.7 g, respectively) were similar for DY1/AT, MIX/control, and MIX/AT ewes, and less ($P < .05$) than DY1/controls (1.49 ± .10 kg and 77.4 ± 5.1 g, respectively). This observation confirms inhibition of the milk ejection reflex during machine milking of MIX/control ewes, as only 75% of total machine milk and milk protein is recuperated (cisternal milk). MIX/control and MIX/AT ewes yielded less ($P < .001$) milk fat (28.8 ± 4.3 g) compared to DY1/AT ewes (57.2 ± 6.1 g). When OT was injected to remove all of the milk within the udder, MIX/OT ewes had similar milk and milk protein yield, but 34% less ($P < .001$) milk fat yield than DY1/OT ewes. These results demonstrate that yield and storage of milk and milk protein within the udder is similar for MIX and DY1 ewes, however, there appears to be proportionally less cisternal storage of milk fat in MIX ewes. The present experiment raises further questions concerning the alveolar transfer, stasis and inhibition of milk fat synthesis in ewes managed within the MIX system.

Key Words: Dairy Ewe, Milk Fat, Milk Ejection

968 Supplementing ewe diets with a microbial enzyme preparation (Fibrozyme). I. Effects on production characteristics during lactation. D. K. Aaron*[1], D. G. Ely[1], W. P. Deweese[1], E. Fink[1], B. T. Burden[1], and K. A. Dawson[2], [1]*University of Kentucky, Lexington, KY,* [2]*Alltech Biotechnology Center, Nicholasville, KY.*

Twenty-four Polypay ewes (70 kg), with twin lambs, were used to determine effects of dietary supplementation with a microbial enzyme preparation (Fibrozyme, Alltech Biotechnology Center, Nicholasville, KY) on production characteristics. Each ewe and her lambs were placed in individual pens, at 8 d postpartum, and randomly assigned to one of two treatments: F (2 g Fibrozyme, topdressed, 2x/d, n = 12) or C (no Fibrozyme, n = 12). The daily basal diet consisted of 1.0 kg grain, 0.9 kg alfalfa cubes, and corn silage fed to appetite. Ewes, separated from lambs, had access to diets from 0800 to 0930 and 1600 to 1730 daily. Lambs had continual access to a creep diet beginning on d 26. Ewes and lambs were individually weighed and ewes body condition-scored and machine-milked every 7 d from d 15 through 64 of lactation. Weekly feed and creep intakes were recorded. By d 29, estimated 24-h milk production was higher for F than for C ewes (3.17 vs 2.80 kg; $P < .05$), and F ewes continued to produce more milk ($P < 0.05$) on each of the remaining collection days (d 36: 3.08 vs 2.66; d 43: 3.00 vs 2.58; d 50: 3.00 vs 2.48; d 57: 2.70 vs 2.23; d 64: 2.33 vs 1.70 kg). Overall, F ewes produced 18 kg more milk (144 vs 126; $P < .01$), consumed slightly more feed (275 vs 269 kg), and produced milk more efficiently (0.52 vs 0.47; $P < 0.10$). Ewes in both groups tended to gain weight and condition, but no significant differences were found between treatments. Lamb pairs nursing F ewes consumed less creep feed from d 26 through 64 than those nursing C ewes (37.6 vs 45.6 kg; $P < .05$), but twin lamb weaning weights were similar (52.8 vs 53.4 kg) and lamb production efficiencies were equal (0.12). These results indicate Fibrozyme can have a positive effect on milk production, but its effects on lamb growth may be offset by lower creep feed intake.

Key Words: Ewes, Lactation, Enzyme Supplement

969 Supplementing ewe diets with a microbial enzyme preparation (Fibrozyme). II. Effects on nutrient utilization during lactation. D. G. Ely*[1], D. K. Aaron[1], W. P. Deweese[1], E. Fink[1], B. T. Burden[1], and K. A. Dawson[2], [1]*University of Kentucky, Lexington, KY,* [2]*Alltech Biotechnology Center, Nicholasville, KY.*

Twenty-four Polypay ewes (70 kg), with twin lambs, were used to determine effects of dietary supplementation with a microbial enzyme preparation (Fibrozyme, Alltech Biotechnology Center, Nicholasville, KY) on total GI tract nutrient digestibility and ruminal metabolism. Each ewe and her lambs were placed in individual pens, at 8 d postpartum, and randomly assigned to treatment: F (2 g Fibrozyme, topdressed, 2x/d, n = 12) or C (no Fibrozyme, n = 12). The daily basal diet contained 1.0 kg grain mix, 0.9 kg alfalfa cubes, and corn silage fed to appetite (3.9 kg av.) from d 8 through 64 postpartum. Ewes, separated from lambs, had access to diets from 0800 to 0930 and 1600 to 1730 daily. Fecal grab samples were taken at 12-h intervals, advanced 2 h daily, from d 33 to 39. Samples were dried, composited by ewe, and analyzed for DM, N, ADF, and NDF. Acid-insoluble ash was used as an internal indicator. After the last fecal sampling at 0800 on d 39, ruminal fluid was obtained from each ewe with a stomach tube (0 h). Ewes were fed immediately after this sampling. Ruminal fluid was also collected 2, 4, 6, and 8 h post-feeding. The pH was determined as samples were collected. Samples were subsequently analyzed for VFA. Digestibilities (%) of DM, CP, ADF, and NDF were 62, 58 ($P < 0.05$); 61, 59 ($P < 0.05$); 32, 27 ($P < 0.05$); and 30, 25 (ns) for F and C, respectively. Ruminal fluid pH was not affected by diet. Total VFA, acetate, butyrate, and valerate concentrations were greater ($P < 0.05$) with F at 8 h post-feeding. Propionate, isobutyrate, and isovalerate were unaffected by diet. Acetate to propionate ratios were greater ($P < 0.05$) for F at 6 and 8 h after feeding. These results indicate Fibrozyme can increase nutrient utilization, by altering ruminal metabolism, in ewes fed high roughage lactation diets.

Key Words: Enzyme, Digestibility, Ruminal VFA

ASAS/ADSA Ruminant Nutrition: Growing Cattle

970 Influence of mass of ruminal contents on voluntary intake of steers fed concentrate and forage diets. Marcela A. Schettini*, Edward C. Prigge, and Eric L. Nestor, *West Virginia University.*

Five ruminally cannulated steers (590 kg) were fed a high concentrate (C) or a hay (H) diet in a 5 x 5 Latin square experiment to evaluate the influence of mass of rumen contents on voluntary intake and rumen function. Mass of ruminal contents was altered by adding varying weights of modified tennis balls (6.7-cm diameter) to the rumen before the initiation of each experimental period. Treatments consisted of 0 balls added to the rumen and fed 70 % C (control), 75 balls with a specific gravity (SG) of 1.1 fed C, 75 balls with SG 1.4 fed C, 75 balls with SG 1.1 fed H, and 75 balls with SG 1.4 fed H. Total weight of the balls was 12.75 and 16.35 kg for 1.1 and 1.4 SG, respectively. Daily DMI was 15.11, 11.93, 10.65, 6.09, and 5.10 for control, 1.1 SG balls fed C diet, 1.4 SG balls fed C diet, 1.1 SG balls fed H diet, and 1.4 SG balls fed H diet, respectively. Addition of balls into the rumen of steers fed the C diet decreased DMI ($P < 0.01$), and increasing SG of balls in the C and H diet decreased DMI ($P < 0.05$) further. Digestibility of NDF, ADF, and CP, and DM were not influenced by the addition of balls nor by increasing SG of the balls for steers fed C and H diet. Adding balls to the rumen of steers fed the C diet decreased particle passage rate (PR) ($P < .05$), while increasing SG of balls decreased particle PR for C and H diet. Liquid dilution rate (LDR) was decreased by the addition of balls in the rumen of the steers ($P < 0.05$) fed the C diet and increasing SG of the balls decreased LDR ($P<0.01$) for both H and C diets.