of its nitrogen fixation capabilities and crude protein concentration, Illinois bundleflower (IBF) has potential in livestock grazing systems for restored landscapes. The objective of the current study was to compare IBF with alfalfa (*Medicago sativa*) and evaluate their effects on nutrient digestion and ruminal microbial fermentation using dual flow continuous culture fermenters. Eight fermenters were provided with diets consisting of either 100% IBF or 100% alfalfa, fed at a rate of 75 g/d for 10 d, and supplied 1.7 and 2.3 g N/d, respectively. Alfalfa contained 34.3% NDF, 24.4% ADF and 20.3% CP while IBF contained 37.7% NDF, 26.4% ADF and 15.0% CP. Solids and liquid dilution rates were maintained at 4.5 and 10%/h, respectively, while fermenter pH was maintained between 6.0 and 7.0. Average fermenter pH was higher ($P < 0.05$) for the IBF treatment (6.53) than the alfalfa treatment (6.13). True organic matter digestion averaged 48.3%, and did not differ between forage source. Non ammonia-N was greater ($P < 0.05$) for alfalfa (1.34 g/d) than for IBF (1.12 g/d). Total N flow was also greater ($P < 0.05$) for alfalfa but bacterial N flow was similar ($P > 0.05$) for the two legumes. For alfalfa and IBF respectively, crude protein degradation (65.2 and 59.7%), NDF digestion (38.7 and 44.3%), and efficiency of bacterial protein synthesis (17.3 and 12.9 g of N/kg OM truly digested) did not differ ($P > 0.05$) between forages. Results from this study indicate that Illinois bundleflower has the potential to be a sufficient N and fiber source for grazing ruminants.

Key Words: Illinois bundleflower, Forage, Fermentation

254 The effect of yeast *(Saccharomyces cerevisiae)* culture included in a free-choice mineral mix on milk production in beef cattle in a fescue-based pasture grazing system. D.J. Kobs* and S.L. Boyles, *The Ohio State University. Columbus, Ohio.*

Cows and calves grazing on Tall Fescue *(Festuca arundinacea)* pasture had access to free-choice control (C) or yeast-culture (Y) mineral mix. The evaluation of milk production was conducted over three years. Control and yeast groups were comprised of 1 group per treatment for Year 1, 4 groups per treatment for Year 2, and 6 groups per treatment for Year 3. Group served as the experimental unit. Milk production was estimated using a weigh-suckle-weigh technique, at approximately Day 60 and Day 120 post-calving. On each day of milk production evaluation, the calves were separated from the cows for 8 h. After 8 h., the calves were weighed and then allowed to suckle for approx. 10-15 min. After suckling, the calves were immediately re-weighed to assess milk production. The weigh-suckle-weigh technique was conducted three times over 24-h. period. The three weight changes were combined and represented an estimate of milk production in a 24-h period. For Year 2, Y cows tended ($P = 0.06$) to have a higher (5.6 kg.) Day 120 estimated milk production over the C cows (4.3 kg.) When Day 60 and 120 were combined, the Y cows had a significantly ($P=0.05$) higher (6.5 kg.) estimated milk production over the C cows (5.3 kg.). For Year 3, Y cows had a significantly ($P=0.05$) higher (6.3 kg) estimated milk production over the C cows (5.0 kg.). When Day 60 and 120 were combined, the Y cows tended ($P=0.08$) to have a higher (6.9 kg.) milk production estimate over the C cows (6.1 kg.). No differences were found at the Day 60 in Year 2 or 3. When all years were combined, Day 120 Y cows had a significantly ($P \leq 0.01$) higher (5.9 kg.) estimated milk production when compared to C cows (4.6 kg.). In addition, when all years were combined, Day 60 and 120 (combined) Y cows had a significantly ($P \leq 0.01$) higher (6.7 kg.) milk production estimate compared to C cows (5.7 kg.). No differences were found at the Day 60 when all years were combined. Increases in milk production were most likely attributable to increases in intake and digestibility in the late summer months reported in other concurrent experiments.

Key Words: Beef cattle, Yeast culture, Milk production

255 Ruminal undegradable proteins and protein fractions in alfalfa (*Medicago sativa* L.). G. F. Tremblay*, R. Michaud, G. Belanger, and J. Michaud, *Agriculture and Agri-Food Canada, Sainte-Foy, QC, Canada.*

Alfalfa quality would be greatly improved by an increase in its ruminal undegradable protein (RUP) concentration. In a first experiment, 14 genotypes, each represented in the field by four plants harvested at early bloom in the spring of the first production year, were assessed for protein degradation using a rumen inhibitor *in vitro* procedure and the Cornell Net Carbohydrate and Protein System. This system divides protein fractions into soluble non protein N (A), soluble true protein (B1), rapidly degradable true protein (B2), slowly degradable protein (B3), and undegradable protein (C). Genotypes did not differ significantly ($P>0.10$) for CP concentration and the fraction C. However, genotypes differed significantly for fractions A + B1 (32.8 to 46.8%, average of 40.6% of CP, $P<0.01$), fraction B2 (46.2 to 59.6%, average of 52.0% of CP, $P<0.01$), fraction B3 (3.1 to 4.9%, average of 4.1% of CP, $P<0.05$), and *in vitro* RUP concentration (26.6 to 36.0%, average of 30.8% of CP, $P<0.05$). *In vitro* RUP was significantly correlated ($P<0.05$) to fractions B2 ($r = 0.81$) and B3 ($r = 0.52$). In a second field experiment, whole plants of 27 cultivars, seeded in triplicates and harvested at 10% bloom in the spring of the second production year, were assessed for *in vitro* RUP and protein fractions using the same procedures. Cultivars did not differ significantly ($P>0.10$) for any of the protein fractions, including *in vitro* RUP. Fractions A + B1 accounted for 44.3 (42.5 to 47.2) % of CP, fraction B2 for 49.4 (46.9 to 51.8) % of CP, fraction B3 for 2.2 (1.8 to 2.7) % of CP, fraction C for 4.1 (3.4 to 4.8) % of CP, and RUP for 24.3 (22.5 to 26.3) % of CP. Correlations between *in vitro* RUP values and fractions B2 ($r = 0.46$) and B3 ($r = 0.35$) were also significant ($P<0.05$). Our results indicate the presence of genetic variability for ruminal undegradable proteins among alfalfa genotypes and the positive relationship between *in vitro* RUP concentration and degradable true protein fractions (B2 and B3) for both genotypes and cultivars.

Key Words: Ruminal Undegradable Proteins, CNCPS Protein Fractions

Physiology
Endocrinology and Metabolism

256 Effect of 14-day subcutaneous injections of several dosages of glucagon on milk yield and composition in lactating dairy cows. G. Bobe*[1], B. N. Ametaj[2], D. C. Beitz[1], and J. W. Young[1], [1]*Iowa State University, Ames, IA,* [2]*Purdue University, West Lafayette, IN.*

Fatty liver is a major metabolic disease of dairy cows in early lactation that can be treated by 14-day continuous intravenous infusions of glucagon beginning at d 21 postpartum. Intravenous infusions of glucagon decrease milk yield and concentrations of milk protein and fat and increase milk lactose concentrations at the beginning of the infusion period. We tested whether 14-day subcutaneous injections of several dosages of glucagon beginning at d 8 postpartum have the same effect on milk yield and composition in dairy cows as continuous intravenous infusions of glucagon. Multiparous Holstein cows (n=32) were grouped on the basis of their liver TAG concentration at d 4 postpartum into "Normal" (n=8; <10 mg TAG/g wet weight) and "Susceptible" (n=24; >10 mg TAG/g wet weight) cows. "Susceptible" cows were assigned randomly to 3 groups and received beginning at d 8 postpartum 0 (Saline Susceptible), 2.5 (7.5 mg/d Glucagon), or 5 mg (15 mg/d Glucagon) glucagon in 60 ml saline (pH 10.25) by subcutaneous injections of glucagon every 8 h for 14 d. "Normal" cows (saline Normal) received the same treatment as "Saline Susceptible" cows. Milk production and composition and dry matter intake (DMI) were measured at d 4, 6, 11, 21, 24, 28, 35, and 42 postpartum. Glucagon injections decreased milk protein yield and concentrations ($P \leq 0.1$). Milk fat concentrations and milk urea nitrogen yield and concentrations decreased during the 14-day glucagon injection period ($P \leq 0.1$). Milk fat yield, milk lactose and organic substance yield and concentrations were not affected by glucagon injections ($P \geq 0.1$). In contrast to continuous intravenous infusions of glucagon, milk yield and DMI were not affected by subcutaneous injections of glucagon ($P \geq 0.1$). We conclude that subcutaneous glucagon injections have similar effects on milk yield and composition as continuous intravenous infusions without the detrimental effects on milk yield and DMI. We conclude that subcutaneous glucagon injections every 8 h for 14 d beginning at d 8 postpartum increase amino acid uptake by the liver for gluconeogene-

sis, thereby decreasing amino acid availability for the mammary gland. (Partly supported under CREES-USDA agreement 99-35005-8576).

Key Words: Fatty Liver, Glucagon, Milk

257 Effect of 14-day subcutaneous injections of several dosages of glucagon on plasma parameters in lactating dairy cows. G. Bobe*[1], B. N. Ametaj[2], R. Nafikov[1], D. C. Beitz[1], and J. W. Young[1], [1]*Iowa State University, Ames, IA,* [2]*Purdue University, West Lafayette, IN.*

Many metabolic diseases in dairy cows in early lactation are associated with decreased plasma glucose and insulin and increased β-hydroxybutyrate (BHBA) and NEFA concentrations that can be reversed by 14-day continuous intravenous infusions of glucagon beginning at d 21 postpartum. We tested whether 14-day subcutaneous injections of several dosages of glucagon beginning at d 8 postpartum have the same effect in dairy cows as the less practical continuous intravenous infusions of glucagon. Multiparous Holstein cows (n=32) were grouped on the basis of their liver TAG concentration at d 4 postpartum into "Normal" (n=8; <10 mg TAG/g wet weight) and "Susceptible" (n=24; >10 mg TAG/g wet weight) cows. "Susceptible" cows were assigned randomly to 3 groups and received beginning at d 8 postpartum 0 (Saline Susceptible), 2.5 (7.5 mg/d Glucagon), or 5 mg (15 mg/d Glucagon) glucagon in 60 ml saline (pH 10.25) by subcutaneous injections of glucagon every 8 h for 14 d. "Normal" cows (saline Normal) received the same treatment as "Saline Susceptible" cows. Plasma α-amino nitrogen (AMN), β-hydroxybutyrate (BHBA), glucose, insulin, NEFA, and urea nitrogen (PUN) concentrations were measured 1 hr after injections at d -4, 4, 8, 11, 14, 21, 28, 35, and 42 postpartum. Glucagon injections increased plasma glucose, insulin, and PUN concentrations, decreased plasma AMN and NEFA concentrations ($P \leq 0.1$), and decreased BHBA concentrations numerically. These effects were similar to those of continuous intravenous glucagon infusions. The increased glucose concentrations continued after glucagon injections in "15 mg/d Glucagon" cows ($P \leq 0.1$). The "15 mg/d Glucagon" cows had stronger plasma glucose and insulin and smaller plasma NEFA responses than did "7.5 mg/d Glucagon" cows ($P \leq 0.1$). We conclude that subcutaneous glucagon injections every 8 h for 14 d beginning at d 8 postpartum increase the cellular glucose supply in dairy cows by increased conversion of plasma amino acids to glucose in the liver and increased cellular glucose uptake. Therefore, we can conclude that subcutaneous glucagon injections every 8 h for 14 d beginning at d 8 postpartum are an effective and practical method to improve the health of dairy cows in early lactation. (Partly supported under CREES-USDA agreement 99-35005-8576).

Key Words: Fatty liver, Glucagon, Early lactation

258 Effects of lasalocid on serum concentrations of IGF-I: Correlations among serum concentrations of IGF-I, leptin, and reproductive performance of postpartum Brahman cows. T. A. Strauch*[1], D. A. Neuendorff[1], C. G. Brown[1], M. L. Wade[1], A. W. Lewis[1], D. H. Keisler[2], and R. D. Randel[1], [1]*Texas Agricultural Experiment Station, Overton, TX,* [2]*University of Missouri, Columbia, MO.*

Forty-one Brahman cows were blocked to control (C; n=20) or lasalocid (L; n=21) treatments by BW, body condition score (BCS), and expected calving date. Treatment began 21 d prior to expected calving. Cows were fed 1.4 kg/hd/d of 11:1 corn:soybean meal and the L group received 200 mg/hd/d lasalocid. Cows and calves were weighed and cow BCS assessed at calving and at 28 d intervals thereafter. Blood samples were collected weekly prepartum, at parturition, and twice weekly thereafter. Sterile marker bulls were maintained with cows for estrous detection. Six d after estrus, ovaries were evaluated for corpus luteum (CL) formation, and blood samples from d 6, 7, 8 after estrus were collected. Serum samples were assayed for progesterone (P_4) and leptin concentration. P_4 concentrations > 1 ng/ml were considered indicative of a functional CL. Treatment ended after completion of a normal estrous cycle. Cows removed from treatment were placed with a fertile bull equipped with a chinball marker. There was no treatment difference (P > .10) in serum concentrations of IGF-I. Prior to calving there were negative correlations between leptin and P_4 (P < .0001; r = -.36) and IGF-I and P_4 (P < .01; r = -.20). At calving, there was a positive correlation between leptin and IGF-I (P < .04; r = .32). During the postpartum period, there was a negative correlation between leptin and postpartum interval (PPI; P < .0001; r = -.27), and positive correlations between leptin and cow BW (P < .02; r = .36) and leptin and cow BCS (P < .06; r = .29). These results indicate that feeding an ionophore prior to calving and throughout the postpartum period did not increase serum concentrations of IGF-I. Concentrations of leptin were positively correlated with IGF-I, cow BW and BCS, and negatively correlated with PPI. Nutritional management to increase leptin concentrations postpartum may result in reduced PPI.

Key Words: Leptin, Reproduction, Cows

259 Breedtype influences adrenal responsiveness to ACTH in beef steers. R.J. Hollenbeck*[1], T.M. Bryan[1], T.A. Strauch[2], D.A. Neuendorff[2], A.W. Lewis[2], C.G. Brown[2], R.D. Randel[2], and T.H. Welsh, Jr.[1], [1]*Texas Agricultural Experiment Station, College Station,* [2]*Texas Agricultural Experiment Station, Overton.*

Adrenal responsiveness to exogenous ACTH was studied by use of Angus, Brahman, Bonsmara and BonsmaraXAngus steers (BW=231.1±7.1 kg; n=7 for each breedtype). Blood samples were collected via indwelling jugular cannula at 15-min intervals for 2.5 hr prior to and 5 hr after ACTH administration (0.1 IU/kg BW). Plasma concentration of cortisol (CS) was determined by RIA. Data were analyzed by the GLM procedure of SAS. During the 2.5-hr sampling period prior to ACTH administration plasma CS was lower in the Bonsmara steers (10.7±5.7 ng/ml) relative to the BonsmaraXAngus (26.4±5.7 ng/ml, P<.06), Brahman (21.7±5.7 ng/ml) and Angus steers (33.1±5.7 ng/ml, P<.01). At "Time 0" plasma CS was higher in the BonsmaraXAngus steers (36.0±5.5 ng/ml) relative to the Angus (18.8±5.5 ng/ml; P<0.03), Brahman (15.2±5.5 ng/ml; P<0.01), and Bonsmara steers (7.0±5.5 ng/ml; P<0.0009). Peak plasma concentration of CS after ACTH administration was higher for the Bonsmara steers (60.5±6.5 ng/ml), intermediate for the Angus (53.8±6.5 ng/ml) and BonsmaraXAngus (54.86±6.5 ng/ml) steers and lower for Brahman steers (40.0±6.5 ng/ml). The amplitude of the CS response was greater for Bonsmara steers (51.6±4.9 ng/ml) compared to the Angus (35.0±4.9 ng/ml), Brahman (24.8±4.9 ng/ml; P<.0008), and BonsmaraXAngus steers (18.9±4.9 ng/ml; P<.0001). After basal levels were reestablished post-ACTH, the Bonsmara steers maintained a lower plasma concentration of CS (4.7±3 ng/ml) when compared to the Angus (15.2±3 ng/ml, P<.02), Brahman (14.5±3 ng/ml, P<.03), and the BonsmaraXAngus steers (10.2±3 ng/ml) who did not differ from one another. In summary, plasma concentration of CS varied among breeds prior to and following adminstration of exogenous ACTH. The Bonsmara, a tropically adapted Sanga-influenced breed, had the lower basal levels of CS and the greater response to ACTH. These data are relevant in efforts to utilize various tropically adapted breeds of cattle.

Key Words: cortisol, breedtype, stress

260 Estrogen regulation of somatotrophic genes in livers of prepubertal ewes. T.M. Bryan*[1], C.A. Gray[1], S.K. Durham[2], T.E. Spencer[1], and T.H. Welsh, Jr.[1], [1]*Texas Agricultural Experiment Station, Texas A&M University, College Station,* [2]*Diagnostic Systems Lab, Webster, TX.*

Estrogenic anabolic agents may promote growth by stimulation of somatotrophic hormones; therefore, the effect of an exogenous estrogen on liver weight and expression of growth-related genes was studied in sheep. Ewes were randomly assigned at birth to receive daily subcutaneous injections of corn oil vehicle (Control, n=5) or estradiol-17β valerate (EV, n=6; 50 μg per kg of body weight) to postnatal day (PND) 55. At 4-day intervals, body weights were recorded and blood samples collected by venipuncture. The ewes were euthanized on PND 56 at which time the livers were collected, weighed and frozen. Serum concentrations of estradiol-17β and insulin-like growth factor-I (IGF-I) were determined by RIA and IRMA, respectively. Liver levels of growth hormone receptor (GH-R), IGF-I, IGF-II, IGF-IR, IGF-IIR and 18S rRNA mRNAs were quantified by slot blot analysis. Data were analyzed by the GLM procedure of SAS. Over the 56-day experiment, average serum concentrations of estradiol ranged from 5 to 22 pg/ml for the Control and from 290 to 1235 pg/ml for the EV-treated ewes. Serum IGF-I increased from PNDs 1 to 9 for both Control and EV ewes and did not differ between treatments. However, for the remainder of the sampling dates serum IGF-I was elevated (P<0.01) in EV-treated ewes (range: 267 to 385 ng/ml) relative to Control ewes (range: 154 to 261 ng/ml). Final body weight did not differ between Control and EV-treated ewes. Liver GH-R

mRNA was lower (P<0.04) in EV-treated ewes relative to Control ewes. However, EV treatment increased liver content of IGF-IR (P<0.03) and IGF-IIR (P<0.01) mRNAs relative to Control ewes. EV treatment did not affect liver content of IGF-I or IGF-II mRNAs. Liver weight was correlated with serum concentration of IGF-I at termination (r=0.61; P<0.05) and with liver IGF-I mRNA (r=0.81; P<0.01). Liver IGF-I mRNA was not significantly correlated with average serum concentration of IGF-I over the 56-day study (r=0.51; P<0.12) though it was significantly correlated with final body weight (r=0.75; P<0.01). These data demonstrate the temporal changes in serum concentration of IGF-I during the initial 56 days of postnatal life and suggest that estrogens can modify liver expression of growth related genes in prepubertal ewes.

Key Words: sheep, liver, IGF

261 Metabolic responses to a glucose challenge in heifers with different body condition at calving and postpartum anoestrus interval.

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The objective of this study was to determine metabolic responses to a glucose challenge in heifers with different body condition (BC) at calving and the relationships between these responses and the interval from calving to first ovulation (PPAI). Forty Friesian heifers were managed during the last 5 months of gestation to achieve a BC of 4.0 (RES; n=27) or 5.0 (FF; n=13) by 6 weeks pre-partum. Half of the RES group then received ad libitum pasture feeding for the final 6 weeks until calving (RES+FF; n=12). After calving all heifers were fully fed as a single herd. Liveweight (LW) and BC were assessed weekly. Two weeks after calving, animals received an intravenous infusion of glucose (300 mg D-glucose/kg LW) and blood samples were collected at #30, -15, -5, 0, 5, 10, 15, 20, 30, 40, 60 and 120 minutes relative to the time of the infusion for measurement of glucose, insulin, IGF-I and leptin. Concentrations of progesterone in milk were measured 3 times a week after calving to monitor time of ovulation. Differences in PPAI were examined using survival analyses, due to censored data. By 11 weeks after calving 8% (1/15) of the RES group had ovulated compared with 75% (9/12) of the RES+FF group and 69% (9/13) of the FF group and PPAI differed between groups (P < 0.01). Mean (± SEM) LW at calving was 448 ± 10 kg; 388 ± 6 kg and 346 ± 7 kg and BCS was 4.7 ± 0.07; 4.3 ± 0.08 and 3.5 ± 0.13 for FF, RES+FF and RES groups, respectively (P < 0.001). Both variables were correlated with PPAI (P < 0.01). Plasma concentrations of glucose, insulin, IGF-I and leptin following glucose challenge did not differ between the three groups (P > 0.05). In conclusion, the response of circulating glucose, insulin, IGF-I and leptin to a glucose challenge in heifers did not vary with differences in body condition at calving or with differences in the interval from calving to first ovulation.

Key Words: Dairy cattle, Anovulation, Glucose challenge

262 Characterization of reations to intravenous immunoglobulin in neonatal calves.

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Intravenous immunoglobulin (IVIG) products improve passive immunity in neonates. Unfortunately, adverse reactions can occur. This study was designed to determine if physiological changes occurring after IVIG administration were the result of rapid infusion of large molecular weight molecules, or from a more complex mechanism resulting in histamine release. The IVIG was concentrated from bovine abattoir blood and contained approximately 35 g IgG/L. A 50% dextran (75,000 MW) solution was prepared as a high molecular weight control. Holstein bull calves (n=15) under 1 wk of age were assigned to one of three treatment groups: control calves received 500 ml of 0.9% NaCl; dextran calves received 500 ml of dextran; IgG calves received 500 ml of IVIG. Treatments were rapidly administered (less than 5 min) intravenously via jugular catheter. Heart rate, respiration rate, and blood pressure were measured prior to treatment, and at 1, 3, 5, 10, 15, 20, 25, 30, 45, 60, 75, and 90 min after start of infusion. Blood samples were obtained at the same sampling times, centrifuged, and the plasma immediately placed on ice for determination of histamine concentration using an enzyme immunoassay. Mean respiration rates were higher in calves treated with IVIG compared to calves in the other groups at all time periods measured. Mean heart rates were lower in calves treated with IVIG compared to calves in the other groups through 45 min. Calves treated with dextran had higher mean heart rates than calves on the control treatment from 10 min through 30 min. Mean blood pressure tended to be higher in calves treated with IVIG compared to calves on the control treatment at 1 min, however, there were no differences between groups at any other time period. Mean histamine concentrations were higher in calves treated with IVIG compared to calves on the control treatment at 1 min, but were not different at any other time period. These data indicate that adverse reactions to IVIG in calves are not mediated by high molecular weight molecules nor by histamine release.

Key Words: Calf, Immunoglobulin, Histamine

263 The somatotrophic axis and lipid metabolism in transition dairy cows in relation to timing of first postpartum ovulation.

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Negative energy balance during early lactation is associated with uncoupling of the somatotrophic axis (ST) and low levels of insulin-like growth factor-I (IGF-I). IGF-I may be one of the signals communicating energetic state, thus regulating postpartum ovarian activity. The objectives of this study were to characterize changes in metabolic signals and the ST axis during the transition period from late pregnancy to early lactation in relation to timing of first postpartum ovulation. Dairy cows (n=46) were studied from 21 d before until 21 d after parturition. Blood samples were analyzed for estradiol, progesterone, insulin, IGF-I, NEFA, and BHBA. Liver biopsies (d 1 and 21 postpartum) were analyzed for triglycerides (TG) and mRNA for growth hormone receptor 1A (GHR-1A) and IGF-I. The first dominant follicle (DF) ovulated (OV) in 30% of the cows during the first 3 weeks postpartum in response to higher (P<0.02) estradiol levels than in cows with non-ovulatory (NOV) follicles. Plasma IGF-I and insulin levels were not different between OV and NOV cows, but OV cows had lower (P<0.03) NEFA, BHBA, and TG. OV cows accumulated less TG in proportion to NEFA than NOV cows. Expression of GHR-1A and IGF-I mRNA were not related to ovulation of the DF. GHR-1A and IGF-I mRNA were highly correlated (R2=0.60, P<0.001). GHR-1A mRNA, IGF-I mRNA and plasma IGF-I were lower on d 1 compared to d 21. In the current study a relationship between recoupling of the ST axis for hepatic IGF-I production and timing of postpartum ovulation was not observed. The strong negative relationship of NEFA and BHBA concentrations with ovulatory status of the DF indicates that higher circulating levels may act to inhibit follicular estradiol production and ovulation. Potential sites of inhibition are at the hypothalamus on LH pulse frequency and on follicular sensitivity to metabolic stimuli (eg. insulin and IGF-I).

Key Words: Ovulation, Ketones, NEFA

264 Alterations of blood serum leptin concentrations in dairy cows treated with bovine somatotropin (bST).

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To further elucidate the mode of action of somatotropin to increase milk yield, in particular its effects on feed intake, we aimed to characterize its potential effects on leptin blood concentrations. 21 lactating Brown Swiss cows received a 500 mg subcutaneous injection of sustained-release somatotropin (Posilac®). Two weeks before and 4 weeks after the injections, blood samples were collected every second day. Leptin was quantified by means of an enzyme immuno assay. A specific antiserum was raised in rabbits immunized against recombinant ovine leptin (a kind gift of A. Gertler, Revohot, Israel) and was bound onto microtiter plates via a secondary anti-rabbit sheep antiserum. In a competitive approach, biotinylated leptin or leptin from standard or sample were quantitatively bound to the antiserum, free leptin was removed by washing. Using the streptavidin peroxidase method, bound biotinylated leptin was then quantified. Assay validity in terms of recovery, parallelism, intra- and interassay variation was confirmed. Serum samples were also run in a IGF-1 RIA to identify the time during which bST was maximally effective to stimulate IGF-1. Statistical analyses using the SPSS program tested pregnancy versus non-pregnancy and calving number as potential effectors of basal leptin concentrations: preganant cows (days 106–455 post partum, n = 12) had higher (p = .023) levels than non-pregnant cows (days 57 to 202, n = 9). Calving number had no effect. Comparing leptin levels before bST treatment and during the maximal effect phase, as identified by IGF-1 measurements (days 7 to 13 after bST injections),

within the two groups, leptin was decreased (p=0.04), but only in pregnant cows. Given the lipolytic effect of bST, a decrease of leptin blood concentrations has been expected; the lack of reaction in non-pregnant cows needs further investigation to elucidate whether metabolic and/or endocrine changes related to pregnancy do explain for it.

Key Words: Leptin, Growth hormone, Bovine

265 Plasma leptin concentrations during early pregnancy in the dairy cow. GE Mann*[1], MD Fray[2], and D Blache[3], [1]*University of Nottingham, School of Biosciences, Sutton Bonington, Loughborough, LE12 5RD, UK,* [2]*Institute for Animal Health, Compton, Newbury, RG20 7NN, UK,* [3]*Animal Science, Faculty of Agriculture, University of Western Australia, Nedlands 6907, Australia*.

In dairy cows, poor progesterone secretion following mating is an important cause of early embryo mortality. The aim of the present study was to determine whether a link exists between circulating leptin concentrations and progesterone secretion at this critical time. In study 1, carried out in 20 normally cycling lactating Holstein - Friesian cows, a single plasma samples was collected on day 5 following first insemination. Progesterone concentration was lower in cows failing conceive than in those becoming pregnant (1.7±0.1 vs. 2.4±0.3 ng/ml; $p<0.05$) and increased significantly with increasing plasma leptin concentration ($r^2 = 0.40$; $p<0.005$). In study 2, daily plasma samples were collected from 33 non-lactating Holstein - Friesian cows commencing 72h after induction of luteolysis with prostaglandin (day 1) until day 16. Cows were inseminated 72 and 96h following prostaglandin (n=23) or remained as uninseminated controls (n=10). On day 16, cows were slaughtered and the reproductive tract flushed to collect the embryo, if present, and to determine uterine concentrations of embryonic interferon tau. There was no change in plasma leptin concentration through the sampling period in any group. Furthermore, plasma leptin concentrations were not different between pregnant (2.8±0.6 ng/ml), inseminated not pregnant (2.2±0.3 ng/ml) and control (2.7±0.6ng/ml) cows. There was no correlation between plasma leptin and plasma progesterone. Furthermore, in the pregnant cows, there was no relationship between plasma leptin and embryonic production of interferon tau. The results demonstrate that while a relationship may exist between leptin and progesterone in lactating cows, in the absence of the high metabolic load of milk yield there appears to be no relationship between leptin and either plasma progesterone or early embryo development. Supported by MAFF, MDC and Intervet UK.

Key Words: leptin, cow, progesterone

266 Study of histology and histochemistry of secretory structures of distal parts of digestive tract of Persian sturgeon *Acipenser persicus*. T. Sheibani*, *Dept. of Basic Sciences, Faculty of Vet. Med. University of Tehran*.

Regarding to the importance of the digestive system from the view of variety of secretions following the previous study of the author on anatomy and some microscopic studies on sturgeons and especially on this species, this study was carried out on a total number of ten fresh adult sturgeons from Caspian Sea. Specimens at one centimeter were taken from different parts of the tract. After fixation in phosphate- buffered formalin, they were transfered into the tissue processor, then thin sections of five microns were cut. The sections were subjected to routine and special staining methods such as; Hematoxylin and Eosin, P.A.S , orange G, Alcian blue and Toluidine blue or Johnson#s methods. They were then studied under light microscope. The preintestinal regions including the secretory stomach and the pylorus possess an epithelium of pseudostratified columnar. Mucus secretions of columnar cells are shown by special staining methods such as P.A.S. -Hematoxylin - orange G which provide a protection from autolysis with a thick surface covering mucus. Such secretions with a less viscosity are seen in the mucus neck cells of gastric glands. These branched tubular glands synthesize and secrete gastric Juice containing hydrochloride acid and digestive enzyme, pepsin, which hydrolyses proteins into polypeptide fragments. Presence of gastric glands in forestomach suggest that here chemical digestion by pepsin with concentration of 25-35 units per miligrams of protein at pH 3-4 initiates. In pyloric caecum, intestines and rectum the epithelium of mucosa and their glands is of pseudostratified associated with secretory and goblet cells. Their cytoplasm have coarse eosinophilic granules synthesizing and secreting mucus due to presence of a thick glycocalyx. Numerous of mastocytes with metachromatic granules containing glycosaminoglycans and some neutral proteases showing by toluidine blue methods are present in intestinal mucosa.

Key Words: Histology, Sturgeons, Digestive tract

Ruminant Nutrition
Growing Cattle and Byproducts

267 The effect of feeding three milk replacer regimens on calf intake, body weight gain, and animal performance. C. S. Ballard*[1], H. M. Wolford[1], C. J. Sniffen[1], M. P. Carter[1], P. Mandebvu[1], T. Sato[1,2], Y. Yabuuchi[2], and M. Van Amburgh[3], [1]*W. H. Miner Agricultural Research Institute, Chazy, NY,* [2]*Zen-Noh National Federation of Agricultural Co-operative Associations, Tokyo, Japan,* [3]*Cornell University, Ithaca, NY*.

Sixty Holstein heifer calves at two farms were blocked at birth and randomly assigned to one of three treatments formulated on DM basis: 1) 27% CP/20% Fat fed at 1.5% BW for first week, 2.25% BW from 8 days through 5 weeks, and 1.25% BW from 6 weeks to weaning; 2) 27% CP/20% Fat fed at 200g 2x/day for 2 weeks, 250g 2x/day through weaning; or 3) 27% CP/15% Fat fed at 1.5% BW for first week, 2.25% BW from 8 days through 5 weeks, and 1.25% BW from 6 weeks to weaning. Milk replacer was reconstituted at 12-15% solids. Calf starter (22% CP) and water was available at all times and no forage was offered until weaning. Calves were weaned after consuming 0.7 kg starter for three consecutive days. Feed intake and growth parameters were measured weekly from birth through 10 weeks. Fecal scores and medical treatments were recorded daily. Results are shown in table. Calves fed milk replacer as a percent of BW had a higher total DMI and greater rate of growth for all parameters measured. Calves fed a fixed rate were weaned at an earlier age and had fewer days treated for illness.

		Treatment					Contrasts	
Item		1	2	3	SEM	*P*	2 vs (1+3)	1 vs 3
Wt, kg	birth	42.4	41.2	42.6	0.92	0.884	-	-
	Wk 10	98.9	92.7	102.2	5.66	0.004	<0.001	0.100
WH[1]	Wk 10	91.3	88.8	91.5	0.56	<0.001	<0.001	0.557
HH[2]	Wk 10	95.5	92.6	95.6	0.64	<0.001	<0.001	0.625
SP[3]	Wk 10	96.6	93.6	97.8	0.74	<0.001	<0.001	0.131
Chest[4]	Wk 10	39.7	38.7	40.0	0.34	0.007	0.002	0.272
Wean age,	d	51.1	36.8	49.0	1.55	0.015	<0.001	0.331
Wean wt,	kg	78.9	57.5	79.2	1.86	<0.001	<0.001	0.911
DMI[5],	Wk 4	2.08	1.86	2.31	0.10	0.021	0.014	0.135
	Wk 10	2.61	3.08	2.83	0.13	0.046	0.034	0.223
BCS	Wk 1	2.26	2.12	2.22	0.06	0.245	-	-
	Wk 10	2.76	2.70	2.96	0.09	0.055	0.086	0.076
Treatment	d[6]	3.84	0.74	2.58	0.52	<0.001	<0.001	0.103

[1]Wither height in cm; [2]Hip Height in cm; [3]Length from shoulder to pin in cm; [4]Depth of chest in cm; [5]Dry matter intake as %BW; [6]Days calves treated with electrolytes/antibiotics.

Key Words: Calf, Milk replacer, Crude protein and fat