

Physiology and Endocrinology III

W155 Effects of early gestational undernutrition in the cow on fetal growth and placentomal composition. S. Ford^{*1}, C. Sanders¹, K. Vonnahme², and B. Hess¹, ¹University of Wyoming, Laramie, ²North Dakota State University, Fargo.

Impacts of early gestational undernutrition followed by realimentation on fetal and placentomal growth were determined. Multiparous beef cows bred to the same bull and carrying female fetuses (N=30) were fed in equal numbers to either meet NRC requirements (control; C) to gain weight (average = + 4.25% of BW) or fed below NRC (nutrient restricted; NR) to lose weight (average = - 6.8% of BW) from d 30 to d 125 of gestation. On d 125, ten C and NR cows were necropsied, and the remaining 5 NR cows were realimented to achieve similar BW to C cows when necropsied on d 250 of gestation. At necropsy, placentomes were separated into caruncular (CAR) and cotyledonary (COT) components and pooled. On d 125, while fetal weights of C cows averaged 948 ± 17g, fetal weights of NR cows fell into 2 distinct groups: Group 1 cows had fetal weights similar to those of C cows (974 ± 10g), while fetal weights of Group 2 cows were reduced (773 ± 22g; P<0.05). Group 1 and Group 2 cows both exhibited reduced (P<0.05) CAR weights when compared to C cows (291 ± 20 and 315 ± 16 vs. 413 ± 19g, respectively). In contrast, COT weight of Group 2 cows were reduced (P<0.01) when compared to Group 1 and C cows (193 ± 11 vs. 286 ± 14 and 333 ± 13g, respectively). On d 250, fetal and CAR weights were similar for NR and C cows averaging 26.5 ± 0.6kg and 2764 ± 100g, whereas COT weights of NR cows remained low (1388 ± 86 vs. 2175 ± 126g; P<0.05). CAR and COT vascular densities were similar for placentomes of NR and C cows on d 125. On d 250, NR and C cows had similar COT vascular density; CAR vascular density increased (P<0.01) in NR cows. Early maternal undernutrition had variable impacts on fetal growth by d 125. Decreased fetal weights on d 125 were associated with decreased COT weight. The return of all NR cow fetal weights to those of C cows after realimentation was related to increased growth and vascularity of CAR tissues. Supported by USDA NRI Grant # 2003-35206-12814.

Key Words: Maternal Undernutrition, Placentome Development, Fetal Growth

W156 Production system under which ewes are selected alters nutrient availability to the fetus in response to early pregnancy undernutrition. G. Wu^{*1}, W. Shi¹, T. Spencer¹, B. Hess², P. Nathanielsz³, and S. Ford², ¹Texas A&M University, College Station, ²University of Wyoming, Laramie, ³University of Texas, San Antonio.

Maternal nutrient deprivation during early to mid gestation is implicated in fetal growth restriction, cardiovascular and metabolic dysfunction and health of the resulting offspring. Recently, we reported that when ewes from the University of Wyoming flock (UW ewes; sedentary lifestyle and more than adequate nutrition) were fed 50% of NRC requirements (nutrient restricted; NR) or 100% of NRC (control fed; C) from d 28-78 of gestation, fetal weights, as well as glucose and essential AA concentrations in maternal and fetal blood were markedly reduced in NR vs. C pregnancies. Our objectives were to compare the ability of ewes selected under a markedly different production system to alter the impact of maternal undernutrition on fetal nutrient availability and growth. We utilized range ewes of similar age, breeding, size and body condition from Baggs, Wyoming (Baggs ewes; nomadic lifestyle and limited nutrition), and subjected them to the same maternal undernutrition as UW ewes. On d 78 of gestation, ewes were euthanized and maternal uterine and fetal umbilical plasma obtained. All AA were analyzed by HPLC and quantified on the basis of authentic standards (Sigma Chemicals) using Millennium-32 Software. On d 78, fetal weights were similar for NR (279 ± 13g) and C (272 ± 8g) Baggs ewes. Concentrations of glucose (47 ± 2 vs. 54 ± 2 mg/dl) and 7 essential AA (VAL, LEU, ILE, THR, PHE, LYS and TRP) were reduced (P<0.05) in maternal plasma of NR vs. C Baggs ewes. In contrast, fetal plasma concentrations of glucose (14 ± 2 vs 13 ± 2 mg/dl) and all essential AA were similar between the NR and C Baggs ewes. These data suggest that placentomal blood flow and (or)

glucose and AA transport systems were augmented in NR Baggs ewes. Supported in part by NIH - INBRE Grant # P20RR016474-04

Key Words: Sheep Production System, Maternal Undernutrition, Fetal Growth

W157 Effect of eicosapentaenoic acid on lipid composition and prostaglandin synthesis in bovine endometrial cells in vitro. J. W. Green^{*1}, J. K. Ahola², T. E. Engle³, and P. D. Burns¹, ¹University of Northern Colorado, Greeley, ²University of Idaho, Caldwell, ³Colorado State University, Fort Collins.

Eicosapentaenoic acid (EPA) has been reported to inhibit bovine endometrial prostaglandin (PG) F_{2α} synthesis in vitro. However, the cellular and molecular mechanisms by which EPA regulates prostaglandin synthesis in this cell type are largely unknown. The objective of experiment 1 was to investigate the effect of EPA on lipid composition in bovine endometrial cells in vitro. Cells were grown to 80 to 90% confluence in 120 mm dishes containing 40% Ham's F-12 medium, 40% Eagle minimum essential medium, 10% fetal bovine serum, 10% heat-inactivated horse serum, 200 U/L insulin, 10 mL/L antibiotic/antimycotic solution, and 343 mg/L D-valine at 37°C under a humidified atmosphere of 95% air and 5% CO₂. Culture medium was supplemented with 0, 0.1, 1, or 10 μM EPA (n = 3 replicates/dose). Cells were removed from dishes, washed 3 times with PBS, freeze dried, and long chain fatty acids were methylated and subjected to GC. There was an effect of dose of EPA on lipid composition (P < 0.05). Weight percent of EPA increased, while weight percent of arachidonic acid decreased with increasing dose of EPA added to culture medium (P < 0.05). The objective of experiment 2 was to determine the effect of EPA on total PGF synthesis. Cells were cultured in six-well dishes as described in experiment 1 and grown to 80 to 90% confluence with or without 10 μM EPA (n = 6 wells/dose of EPA). Cells were serum starved for 18 h prior to treatment then treated for 6 h with or without 100 ng/mL phorbol ester (n = 3 wells/treatment). Medium was collected and assayed for total PGF (PGF_{1α}, PGF_{2α}, and PGF_{3α}) by enzyme immunoassay. There was no effect of EPA on basal PGF secretion (P > 0.10), while EPA attenuated phorbol ester-stimulated PGF secretion (P < 0.05). These data indicate that EPA may partially attenuate PGF secretion by reducing available arachidonic acid for 2-series PGF synthesis.

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Key Words: Bovine Endometrial Cells, Prostaglandin, Eicosapentaenoic Acid

W158 Leukocyte populations and cytokine mRNA expression in quarter milk fractions of dairy cows at different SCC levels. H. Sarikaya^{*}, G. Schlamberger, and R. M. Bruckmaier, *Physiology Weihenstephan, Techn. Univ. Munich, Freising, Germany.*

To investigate the distribution of lymphocytes, macrophages and neutrophils (PMN) and the mRNA expression levels of the proinflammatory cytokines TNFα and IL-1β in different udder compartments, quarter milk of different somatic cell counts (SCC) was divided into 3 fractions (C: cisternal, A1: first 400g alveolar and A2: remaining alveolar milk) during the course of machine milking. Quarters were assigned to 4 groups according to their SCC: I) <12,000 (n=6), II) 12,000-100,000 (n=8), III) 100,000-350,000 (n=7), IV) >350,000 (n=8), resp. Cell populations were classified microscopically after panoptic staining. SCC decreased from highest levels in C to lowest levels in A1 and increased thereafter to A2 in all groups. Lymphocytes dominated by far in group I (77±5, 78±5, 77±7% in C, A1, A2, resp.), whereas the content of macrophages and PMN was low (p<0.05). In contrast, the proportion of lymphocytes was low in all fractions of groups II, III and IV (2-40%). Macrophages in C were highest in group II and decreased to groups III and IV (58±3%, 46±4, 33±5%, resp., p<0.05). The content of macrophages decreased during milking in all groups.

In contrast, the proportion of PMN in C was low in group II and was elevated in groups III and IV (18±4, 41±5, 61±5, resp., $p < 0.05$). An increase of PMN content during milking (A1, A2) was observed in all groups. The mRNA expression of TNF α and IL-1 β (measured via real-time qRT-PCR) were similar in C, A1 and A2 in all groups, but cytokine mRNA expression was higher with increasing SCC ($p < 0.05$).

In conclusion, the milk fraction during the course of milking has a crucial influence on the distribution of leukocyte populations in addition to SCC level. The surprisingly low content of macrophages and PMN and concomitantly low cytokine mRNA expression in quarters with SCC <12,000 might cause a reduced immune response to invading pathogens. Contrary, the increased percentage of macrophages and PMN in quarters with higher SCC is also reflected by high cytokine mRNA expression.

Key Words: Milk Fractions, Leukocytes, mRNA Expression

W159 Effects of feeding pattern on plasma ghrelin concentrations in pigs. C. Brown*, R. Harrell, and C. Whisnant, *North Carolina State University, Raleigh.*

The independent role of ghrelin regulation continues to be controversial. Ghrelin, a 28 amino acid peptide identified as the endogenous ligand for growth hormone (GH) secretagogue receptor, is found in the gastrointestinal tract, predominantly the stomach. Ghrelin stimulates GH secretion, increases feed intake, adipose tissue, and decreases gastric acid. The aim of this study was to determine if a change in meal patterns might affect ghrelin levels in barrows. Twelve crossbred barrows (67.1 + 4.5 kg BW) were used. The pigs were placed on their corresponding diets on day 0. Six pigs were placed on continuous access to feed using a typical finishing diet and the treatment group was fed 2.73 kg of feed at 1200 and the remaining feed was removed at 1600. Catheters were placed in the jugular vein on day 7 and samples were taken on day 8, 9, and 11. Plasma ghrelin concentrations were measured every 15 minutes for 4 hours and then every 30 minutes the remaining 2 hours on days 8 and 9 using a commercially available RIA for active ghrelin. A glucose challenge (500 mg/kg BW) was administered on day 11 and a sample was taken before the infusion and then every 15 minutes for 3 hours after the infusion. Data were analyzed by PROC GLM and SAS using treatment and time and the treatment by time interaction in the model.

Average daily gain during the experiment was 0.43 kg and 0.87 kg for the limited compared to continuous access to feed groups. Plasma ghrelin concentrations increased (20%) ($P < .01$) prior to feeding and decreased (20%) after feeding ($P < .01$) relative to baseline in the meal fed pigs. Ghrelin concentrations were decreased after glucose infusion ($P < .01$). Concentrations decreased by 40% after the initial infusion and then remained steady for approximately 2 hours post-infusion. In agreement with reports from other species, ghrelin increased before and decreased after feeding in meal-fed animals. Ghrelin may be an important regulator of feed intake in swine.

Key Words: Ghrelin

W160 Improved development and quality of embryos collected from superovulated Holstein cows in response to repeated subcutaneous injections of vitamin E and selenium. G. Martin-Castaneda*, C. Diaz-Mora, S. Padilla, R. Banuelos, R. M. Rincon, F. J. Escobar, J. M. Silva-Ramos, and C. F. Arechiga, *Universidad Autonoma de Zacatecas, Zacatecas, Zac. Mexico.*

Present study tried to determine the effect of a subcutaneous therapy of vitamin E and selenium administered during the peripartum period of Holstein cows on stage of development and quality of embryos collected transcervically. Study included 12 cows allotted into 2 groups: Control (n=6), cows receiving 10 ml of physiologic saline solution (PSS, Lapisa). Mu-Se (n=6), cows receiving 10 ml injection of Mu-Se containing 500 mg of vitamin E and 50 mg of Selenium (MU-SE, Schering Plough). Both groups received 5 subcutaneous injections during the peripartum period, on d -21, 0, 30, 60, 140 (i.e., d 0=calving).

Cows receiving Mu-Se tended to have a diminished superovulatory response according to the number of corpus lutea (CL) detected by rectal palpation on the date of embryo collection (Control=89 vs. Mu-Se=76). However, number of embryos collected was similar for both groups (Control=16 vs. Mu-Se=13), $P > 0.05$). We obtained an embryo collection efficiency of 17.58% (29 embryos out of 165 CL's). Data was analyzed by Chi-square.

Administration of Mu-Se had a positive influence on embryonic development (Control=3 and 13 vs Mu-Se= 9 and 4, on developmental stages of blastocyst and morula, respectively ($P < 0.05$)). Another positive influence of MU-SE was demonstrated on quality of embryos collected (Quality 1= 3 vs. 8; Quality 2= 2 vs. 2; Quality 3= 3 vs. 1; Quality 4= 8 vs. 2; for Control and Mu-Se, respectively). Such a positive effect of Mu-Se on stage of development and quality of embryos collected, led us to obtain a greater number of embryos able to be cryopreserved (i.e., quality 1 and 2). Number of embryos able to be cryopreserved was 100% higher in the MU-SE group. (Control=5 vs. Mu-Se=10).

In conclusion, subcutaneous administration of a vitamin E and selenium therapy on d -21, 0, 30, 60, 140 (i.e., d 0 = calving), in Holstein cows exposed to superovulation, increases the developmental stage and quality of embryos collected 7 d after insemination.

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Key Words: Dairy Cows, Vitamin E, Embryo

W161 Specific gGlutamate and nucleoside transport activities of Madin-Darby bovine kidney (MDBK) cells are inhibited by the ergopeptide bromocriptine. E. Miles*, J. Boling, and J. Matthews, *University of Kentucky, Lexington.*

This study was conducted to determine (1) the proteins responsible for uptake (pmols/well/4 min) of L-glutamate (GLU) and uridine (URD) by monolayer and/or polarized MDBK cells and (2) if these activities were affected by extracellular bromocriptine (BRCP; 100 μ M), a model ergopeptide agonist of type-2 dopamine receptors (D_2R). GLU (1 μ M) uptake by monolayer and polarized MDBK cells was predominantly (> 83%; $P < 0.001$) by EAAC1-like activity (Na^+ -dependent, high-affinity). Using monolayers, GLU (1 μ M) uptake was inhibited ($P < 0.001$) 26-31% by BRCP and BRCP plus 10 μ M domperidone (DOM, D_2R antagonist), and 13% ($P < 0.001$) by BRCP plus 100 μ M alpha-ergocryptine (ERCP, D_2R agonist). Thus, EAAC1 activity may be stimulated by D_2R -dependent and inhibited by D_2R -independent mechanisms. The expression of Na^+ -dependent (CNT) and Na^+ -independent (ENT) nucleoside transport activities was characterized for polarized MDBK cells. ENT-like uptake of URD (2 μ M) accounted for 87% ($P < 0.05$) of apical and 70% ($P < 0.001$) of basolateral URD uptake. Apical ENT activity was inhibited ($P < 0.05$) 81 and 93% by 1 μ M and 10 μ M S-(4-Nitrobenzyl)-6-thioinosine (NBTI), respectively, whereas basolateral ENT activity was inhibited 45 ($P < 0.001$) and 84% ($P < 0.001$), respectively, by NBTI. Basolateral CNT activity was inhibited 100 ($P < 0.002$), 76 ($P < 0.01$), and 52% ($P < 0.05$) by adenosine, guanosine, and thymidine, respectively. Apical URD (0.3 μ M) uptake was inhibited ($P < 0.001$) 83% by BRCP, 90% by BRCP plus ERCP, and 88.7% by BRCP plus DOM. In contrast, basolateral uptake of URD was only reduced ($P < 0.01$) 29% in the presence of BRCP plus ERCP. Thus, ENT-1 is the predominant apical URD transporter expressed by MDBK cells and BRCP inhibits its activity through D_2R -independent mechanism(s). In contrast the activity of basolateral CNT1, CNT3, and/or ENT2 is inhibited by BCRP in a D_2R -like manner. In conclusion, transport of GLU and URD are altered by BCRP.

Key Words: Cow, Glutamate Transport, Nucleoside Transport

W162 An observational analysis of twin births, calf sex ratio, and calf mortality in Holstein dairy cattle. N. Silva del Rio*, S. Stewart², P. Rapnicki², Y. M. Chang¹, and P. M. Fricke¹, ¹University of Wisconsin, Madison, ²University of Minnesota, St Paul.

To assess twinning trends across time, a data set of calving records from Jan 1996 to Sep 2004 comprising 6,226 herds with 2,901,697 calving events was extracted from Minnesota DHIA archives. Cows with parity >7, herds with <100 total calving events, and 489,559 incomplete calving records were removed. The final analysis included 2,318,601 calving records from 4,123 herds representing 1,088,962 Holstein cows and 96,222 twin births (4.1%). Twinning trends across time were analyzed using a logistic regression model including the main effects of calving season (Jan-Mar, S1; Apr-Jun, S2; Jul-Sep, S3; Oct-Dec, S4) and parity (nulliparous heifers, P1; primiparous cows, P2; multiparous cows, P3+) with year as a covariate and all possible interactions. Twinning increased ($P < 0.01$) from 3.4% in Jan 1996 to 4.7% in Sep 2004. The interaction of parity by yr was significant for both linear ($P < 0.01$) and quadratic ($P = 0.01$) terms with a greater increase in twinning by yr for P2 (4.0 to 5.8%) and P3+ (5.2 to 7.1%) than for P1 (1.1 to 1.3%) cows. Odds ratios for twin births in S1, S2, and S3 were 0.85, 1.11, and 1.07, respectively, compared to S4. Based on chi-square analysis, sex ratio (Bull, B; Heifer, H) for singleton calves was 53.4% B, 46.6% H which differed ($P < 0.01$) from 50:50 B:H, whereas sex ratio for twin calves was 30.1% B:B, 43.6% B:H, 26.3% H:H, which differed ($P < 0.01$) from 25% B:B, 50% B:H, 25% H:H. Calf mortality for singleton births was greater ($P < 0.01$) for P1 (10.5%) than for P2 (5.0%) and P3+ (5.3%) cows. Calf mortality for twin births in which one or both calves were stillborn was greater ($P < 0.01$) for P1 (38.4%) than for P2 (26.6%) and P3+ (27.2%) cows, and was greater ($P < 0.01$) for B:B (19.3%) than for H:H (11.0%) twins. Although specific factors cannot be implicated, the increase in twinning across time suggests a concurrent change in one or more causative factors associated with twinning during this time period.

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Key Words: Twinning, Calf Sex Ratio, Calf Mortality

W163 Effects of diet energy concentration and fat addition on reproductive performance and hormone profiles of beef cows. J. E. Rossi^{*1}, N. M. Long¹, W. M. Graves², G. M. Hill¹, and B. G. Mullinix, Jr.¹, ¹University of Georgia, Tifton, ²University of Georgia, Athens.

Two experiments evaluated pre-breeding dietary energy concentration and fat addition on reproductive performance in multiparous cows. In Exp 1, Angus cows ($n=27$; 26.9 ± 1.6 d post-partum) were fed either bermudagrass hay ad libitum (H) or were limit fed a corn based (C) diet for 56 d immediately preceding the breeding season. Treatment diets were ended on the first day of the breeding season. Cows were allowed to graze bermudagrass pasture and bred natural service for 75 d. Exp 1 and 2 were analyzed as a completely randomized design using the PROC MIXED function of SAS. Cow BW loss was greater ($P = 0.04$) for C (-53 kg) than for H (-8.4 kg) cows. Initial body condition score (BCS; 1=emaciated, 9=obese) was similar ($P = 0.96$) between cows fed C (5.5) and H (5.5) diets. Likewise, final BCS was similar ($P = 0.84$) between cows fed C (5.4) and H (5.4) diets. Days to estrus was similar ($P = 0.94$) between treatments, 52.4 and 52.9 d for C and H; respectively. Insulin concentration was similar at d 0 and 28 ($P > 0.85$) but greater ($P = 0.03$) for C than for H cows at d 56. In Exp 2, Angus cows ($n = 40$; 11.7 ± 1.3 d post-partum) were used to evaluate dietary energy concentration and fat addition on reproductive performance. Dietary treatments were arranged in a 2x2 factorial and fed for 56 d immediately preceding the breeding season. Diets consisted of bermudagrass hay offered ad libitum with either 2.1 kg/d whole cottonseed (HF) or 2.5 kg/d of corn and soybean meal mixture (HNF), and limit fed corn based diets with (CF) or without (CNF) 2.1 kg/d whole cottonseed. Final BCS was similar (0.79) among treatments, 5.1, 5.0, 5.1 and 5.1 for HNF, HF, CNF, and CF; respectively. Days to estrus was similar ($P = 0.11$) among treatments. Insulin concentration between C and H diets was similar at d 0 ($P = 0.35$) and 28 ($P = 0.12$), but greater at d 56 ($P = 0.03$) for cows fed C versus H diets. A corn based diet increases insulin concentrations compared with feeding a hay based diet. Overall reproductive performance is not affected by pre-breeding dietary energy concentration or dietary fat addition in mature cows in adequate body condition.

Key Words: Beef Cows, Fat, Reproduction

W164 NEFA and glucose levels in serum of periparturient dairy cows are indicative of pregnancy success at first service. M. Burkhart^{*}, R. Youngquist, J. Spain, J. Sampson, J. Bader, R. Vogel, W. Lamberson, and A. Garverick, University of Missouri, Columbia.

Higher serum levels of non-esterified fatty acids (NEFA) and lower serum levels of glucose indicate a negative energy balance in periparturient dairy cows. The objective of this study was to determine the relationship between NEFA and glucose levels in periparturient dairy cows and subsequent fertility (i.e. pregnancy). Prior to calving, Holstein ($n=82$) and Guernsey dairy cattle ($n=7$) were housed on pasture and fed a total mixed ration (TMR). After calving, cows were housed in a free stall barn and fed a TMR to meet or exceed NRC (2001) recommendations. Serum and plasma samples were taken at approximately 10, 7, and 3d prepartum and 3, 7, 14, and 21d postpartum. At $37d \pm 7d$ postpartum, cows began one of two timed artificial insemination protocols that included Presynch treatments (PGF_{2 α} , 14d later PGF_{2 α} , 14d later GnRH, 7d later PGF_{2 α} , 2d later GnRH). Cows ($n=33$) classified as anestrus by absence of a corpus luteum at first GnRH received a CIDR, which was removed at the third PGF_{2 α} . Cows were randomly assigned by parity (1st and 2nd+ lactations) to be bred either at the last GnRH (CoSynch) or 24h after the last GnRH (OvSynch). Pregnancy was determined at 32d and again at 60d post-insemination by ultrasound. Data were analyzed using a mixed model analysis of variance for repeated measures. Across all days, blood NEFA levels were lower ($p < 0.001$) and glucose levels were higher ($p < 0.001$) for cows that subsequently became pregnant at first service versus those that remained open. Means \pm SE ($\mu\text{mol/L}$) of pregnant and open cows at 3d postpartum were 491 ± 70 and 757 ± 49 of NEFA and were 56.4 ± 1.4 and 52.6 ± 1.4 of glucose, respectively. Logistic regressions were used to predict incidence of pregnancy based on NEFA and glucose levels from individual days. The prediction with the highest likelihood ratio was from 3d postpartum NEFA levels; $\beta_0 = 0.61 \pm 0.49$, $\beta_1 = -0.002 \pm 0.0007$. By using an inverse link function, a cow with a NEFA level of $491 \mu\text{mol/L}$ is predicted to have a 0.40 chance of pregnancy at first service. Nutritional status during the periparturient period may affect subsequent fertility.

Key Words: Conception Rate, NEFA, Glucose

W165 Effects of limb origin and twenty-four hour storage on contractile response of bovine lateral saphenous vein to norepinephrine. J. L. Klotz^{*1}, A. C. Vevoda², L. P. Bush², and J. R. Strickland¹, ¹FAPRU, USDA-ARS, Lexington, KY, ²University of Kentucky, Lexington.

Vasoconstriction has been associated with several symptoms of fescue toxicosis thought to be alkaloid induced. A multi-myograph system permits rapid screening of compounds for vascular activity. However, prior to investigation of bovine vascular effects generated by tall fescue alkaloids using a myograph system, it was necessary to validate several procedural aspects. Experiments were conducted, using dose-response to norepinephrine (NE), to determine if lateral saphenous veins taken from the left limb differed from those taken from the right and to evaluate viability of tissue following 24 h storage at 2-8°C. Segments (2-3 cm) of vein were collected from both left and right legs of healthy mixed breed cattle ($n = 7$) at local abattoirs. Tissue was placed in Krebs-Henseleit oxygenated-buffer and kept on ice or stored at 2-8°C until used. Veins were trimmed of excess fat and connective tissue, sliced into 2-3 mm sections and suspended in a myograph chamber containing 5 mL of oxygenated Krebs-Henseleit buffer (95% O₂/5% CO₂; pH = 7.4; 37°C). Tissue was allowed to equilibrate at 1 g of tension for 1.5 h prior to addition of NE. Increasing doses of NE were administered every 15 min following buffer replacement. Data were normalized as a percent of contractile response induced by maximal dose of NE ($5 \times 10^{-4} \text{M}$) for profiling. Veins from both left and right limbs demonstrated contractions in a dose-response manner ($P < 0.01$), but did not differ between limbs. There were no differences in dose-response to NE between tissue tested the day of dissection and tissue exposed 24 h later. Maximal contractile response to NE did not differ between day for left ($d1 = 20.1$; $d2 = 15.8$ g; SE = 3.9) or right limbs ($d1 = 18.2$; $d2 = 15.1$ g; SE = 2.4). Limb of origin and overnight storage of tissue did not appear to affect tissue responsiveness to NE. Thus, future experiments will not be limited to a single limb and experiments can be extended beyond day of dissection.

Key Words: Bovine, Norepinephrine, Saphenous Vein

W166 Effect of estradiol cypionate® (ECP) on milk production in lactating dairy cows. A. Gümen*, J. P. Powell, A. H. Souza, A. P. Cunha, J. N. Gunther, P. M. Crump, and M. C. Wiltbank, *University of Wisconsin, Madison*.

Previous research indicated that early postpartum treatment with ECP increased milk production in multiparous cows and this was tested in 2 expts. There were an unexpectedly high number of cows with disease conditions (DA, 9.5%; mastitis, 42%; Johne's-positive, 16%) and the rate was unrelated to treatment. Each of these conditions was found to decrease milk production and subsequent analyses only included cows without these conditions. In expt 1, cows were randomly assigned to 1 of 3 treatments: 1) three injections of ECP (4 mg) weekly for 3 weeks (3X; n=13), 2) one injection of ECP (1X; n=19) and 3) control (untreated; n=18) beginning at days 1-4 post-calving. Ovulation was determined by weekly ultrasound. Time to first ovulation (average of 28 to 34 d) and milk production (43.4 to 44.5 kg average during first 20 wks) were similar among treatments. In expt 2, cows were randomly assigned to 1 of 3 treatments: 1) twice weekly treatments with 4 mg of ECP for 3 wks (4mg; n=21) 2) twice weekly (first injection with 4 mg following by 5 injections of 2 mg) treatments with ECP (2mg; n=18) and 3) control (untreated; n=25). Time to ovulation was delayed (P<0.05) with 4mg treatment (51.4±3.0 d) compared to 2mg (44.6±3.4 d) and control (43.4±3.0 d). Milk production began to be greater (P<0.05) at 5 wk after calving in cows treated with 2mg (40.3 kg) compared to controls (36.7 kg). From weeks 5 to 10, cows in 2mg (47.8 kg) tended to produce more (P<0.07) milk than control cows (42.9 kg) with 4mg also tending to be greater (46.4 kg; P=0.16) than controls. Milk production during the entire treatment period was numerically but not statistically higher in 2mg (44.4 kg) compared to controls (40.3 kg) with 4mg intermediate (42.5 kg). Analysis of treatment effects in cows with disease problems had similar trends but with lower milk production and more variability. Thus, multiple treatments with lower doses of ECP may increase milk production but further trials are needed to evaluate the repeatability of this response.

Key Words: ECP, Milk Production, Early Postpartum

W167 Effects of increasing energy density and cooling treatment on ovarian function in postpartum dairy cows under heat stress conditions. J. Y. Wang* and J. C. Kung, *Tunghai University, Taichung, Taiwan*.

The objective was to examine the effect of incrementing energy density and cooling treatment on ovarian function of postpartum dairy cows under heat stress conditions. Holstein cows (12 primiparous and 22 multiparous) were assigned randomly in a 2x2 factorial experiment consisting of a fat supplementation and water sprinkling treatment. The bypass fat was gradually increased from 100g to 400g/d at 4 weeks before calving, and increased at calving to 450g until 60 days after parturition. The automated cooling system which actuated sprinkling (30sec) was followed by forced ventilation (4.5min) and cows were cooled from 8:00 to 16:00. All cows were fed complete ration and residues were weighed back after each feeding. Ovaries were examined by transrectal ultrasonography from calving until ovulation. The data were analyzed following the GLM procedure of SAS. Results showed that the cooling system could effectively reduce rectal temperature (P<0.05) and achieve an earlier recovery of energy balance. The average energy balance from week 1 to week 8 postpartum was -18.3Mcal±0.6Mcal/d vs. -25.2± 0.6Mcal/d in the cooled group versus the control group (P<0.01). Cooled and fat treated cows had less first class (3-5mm) follicles than the controls (3.88± 1.34 vs. 8.13 ±1.13; P<0.05). However, fat supplemented cows developed more second (6-9mm) and third (>9mm) class follicles than the control cows. The interval from parturition to first ovulation was shorter (P<0.06) in the fat supplemented and cooled cows than the untreated cows. But there was no difference in the interval from parturition to the second ovulation and in the interval between the first and second ovulations. These results indicate that fat supplementation and evaporative cooling may have potential in improving postpartum ovarian function under heat stress conditions.

Key Words: Cooling, Fat, Ovarian Function

Production, Management and the Environment: Health and Reproduction

W168 Biosecurity practices related to cattle purchases. F. Hoe and P. Ruegg*, *University of Wisconsin, Madison*.

Wisconsin dairy producers (n = 1102) were surveyed in the fall of 2004 using a mailed questionnaire. A total of 583 farms responded for a response rate of 53%. Overall, herds contained 92 (169.4) lactating cows with a rolling herd average of 8,991 (1,748) kg and a bulk tank somatic cell count (BTSCC) of 245,963 (109,083) cells/ml. Responders were categorized based on the number of lactating cows: very small herds (< 50 cows; n = 279); small (51-100 cows; n = 199); medium (101-200 cows; n = 42); and large (> 200 cows; n = 36). The number of lactating cows was not reported for 27 herds. During the 3 years preceding the survey, 43.7% of the herds reported that they purchased cattle, with more medium (61.0%) and large (77.1%) herds reporting cattle purchases as compared to very small (40.4%) and small herds (39.1%). Overall, little was known about the source of purchased cattle. Only 38.9%, 50.8% and 13.2% of responding herds reported that they asked source herds for information about Johnes disease status, BTSCC or previous Mycoplasma infections, respectively. Medium and large herds were 6.6 times more likely to obtain information about Mycoplasma status as compared to smaller herds. Overall, 48.8% performed a reproductive exam before housing purchased cattle in existing cow groups. Medium and large herds were more likely to perform reproductive exams on purchased cattle (P = 0.04, OR = 1.9). Few herds performed diagnostic tests on purchased cattle. Only 18.3% of the responders tested for Johnes disease, 12.7% tested for BVD, 5.2% tested for bovine leukemia, 30.6% performed SCC or CMT, and < 10% tested milk for mastitis pathogens. As herd size increased, the frequency of diagnostic testing increased (P < 0.005). Only 44.0% and 18.5% of medium and large herds respectively reported that no diagnostic testing was performed for purchased cattle as compared to > 55% of the smaller herds. Many differences in biosecurity practices were identified based on herd size,

suggesting that producers from larger herds were more aware of and able to take preventive actions regarding biosecurity risks associated with purchased cattle.

Key Words: Biosecurity, Cattle, Purchase

W169 Biosecurity practices used during dairy herd expansion. J. Dalton*¹, R. Norell², and M. Chahine³, ¹University of Idaho, Caldwell, ²University of Idaho, Idaho Falls, ³Twin Falls Research and Extension Center, Twin Falls.

The Idaho dairy industry has undergone rapid growth recently. In December 2004, there were 435,000 lactating cows in Idaho, an increase of 163,000 cows in seven years. Consequently, the demand for dairy cattle has increased in order to fill new and remodeled facilities. A survey of Idaho dairy producers was performed to identify biosecurity practices used during herd expansion. Dairy producers, (n = 40; representing each geographical dairy region of the state), which had completed expansion within the last seven years, were selected as participants. Producers were asked questions regarding number and source of cattle purchased; pre-purchase health testing of cattle; use of quarantine for purchased cattle; and diseases contributing to treatments and (or) removal of cows following expansion. The range in herd size, after expansion, was 95 to 5,300 lactating cows. Twenty-three dairy producers (57.5%) reported purchasing greater than 101 animals, while seven dairy producers (17.5%) reported purchasing greater than 1001 animals. Twenty dairy producers (50%) purchased cattle from one source, while the remaining 50% of respondents reported up to four sources for purchased cattle. The majority of producers (80%) did not require health testing (non udder related) of new cattle prior to purchase. Of the