digestibility was determined at 33 d of age. At the end of the trial, piglets fed rice tended to grow faster (345 vs 315 g/d; P=0.08) but had same feed conversion than piglets fed corn. Adding oat hulls to the diet did not affect growth but improved feed conversion (1.51 vs 1.59 g/g; P<0.05). Apparent fecal digestibility of organic matter (76.0 vs 73.8%), crude protein (67.1 vs 62.8%), and gross energy (72.0 vs 69.0%) improved when oat hulls were included in the diet (P<0.01) but was not affected by the main cereal used. In a second trial we compared diets with 52% of heat-processed rice or corn and 0, 2, or 4% of cooked and expanded oat hulls. Each of the six treatments was replicated eight times and the trial lasted 20 d. At the end of the trial, average daily gain was greater for rice than for corn diets (315 vs 286 g/d; P<0.01) but feed conversion was not affected by the main cereal. Increasing the level of oat hulls did not affect performance from 20 to 29 d but improved feed conversion from 29 to 40 d of age (P<0.01). It is concluded that the inclusion of cooked rice in diets for piglets improves performance during the first 20 d after weaning. Also, the inclusion of a moderate amount of heat-processed oat hulls improves feed conversion from 29 to 40 d of age without modifying body weights at any age.

Key Words: Rice, Oat hulls, Piglets

796 The effect of the addition of a starter culture on the fermentation of liquid milled wheat. C. A. Moran*[1] and R. H. J. Scholten[2], [1]*Alltech Inc., Nicholasville, KY,* [2]*Beuker, Doetinchem, The Netherlands.*

A number of concerns have been raised about the fermentation of complete liquid feed diets as this may lead to protein fermentation products, palatability problems and reduced feed intake. An alternative strategy would be to ferment the carbohydrate fraction of the diet separately and combine it with the remainder of the diet immediately before feeding. The aim of this study was to examine the effects of a lactic acid bacteria inoculum on chemical and microbial composition during fermentation of Liquid Milled Wheat (LMW). In this study, LMW (210g DM kg^{-1}) was defined as whole grain wheat, hammer-milled through a 3mm sieve, mixed with water and steeped for 48 hours with mixing every two hours. Two treatments were assigned in triplicate to 45 L PVC storage tanks housed in a temperature-controlled room set at 24°±1°C. The control treatment (Con) received no starter culture whilst the other (SC) was inoculated (6 $\log_{10}$ cfu ml^{-1}) with a starter culture containing *Lactobacillus plantarum* and *Pediococcus pentosaceus*. Samples were removed at Time = 0, 24 and 48 h for chemical and microbiological analysis. Lactic and acetic acid concentrations were measured by capillary electrophoresis. Microbiological counts were determined from decimal dilutions of LMW samples in MRD and plated on MRS, MacConkey and Rose Bengal Chloramphenicol agar for lactic acid bacteria, coliforms and yeast, respectively. Data were analyzed by two-way ANOVA. The inclusion of the starter culture resulted in a lower coliform population (5.8 vs 6.7 $\log_{10}$ cfu ml^{-1}, $P < 0.001$) at the end of the 48h steeping period. However, lactic acid concentration, LAB numbers and pH were not different in Con and SC treatments after 48 h. Coliform inhibition in the SC treatment may have been due to the slightly elevated acetic acid concentration or other unknown anti-microbial fermentation products resulting from starter culture addition. These results indicate that the use of the LAB starter culture combination may prove beneficial during fermentation of LMW for liquid feeding applications.

Key Words: Fermented liquid feed, Liquid milled wheat, Lactic acid bacteria

Physiology
Reproduction

797 Evidence for uterine Effects on fetal Development in the Pig. S.C. Town*, J.L. Patterson, and G.R. Foxcroft, *Swine Research & Technology Centre,University of Alberta, Edmonton, Alberta, Canada, T6G 2P5.*

Even in a proportion of gilts, uterine crowding in early pregnancy has detrimental effects on placental development, with implications for fetal development and postnatal growth capacity. To study this phenomenon further, pregnant gilts (n = 23) underwent midline laparotomy at d30 of gestation to record embryo number in utero and ovulation rate. Subsequently, during farrowing, each piglet born was matched with its placenta using an umbilical tagging procedure and piglet birth weight and placental weight were recorded. Representative day-old piglets from each litter (n=45) were necropsied and brain:liver weight ratio was determined as a measure of intra-uterine growth retardation. In this group of gilts, number of embryos at d30 of gestation was strongly correlated to littersize at term (r^2 = 0.72; P < 0.0001). Although there was a strong positive correlation between placental weight at term and birth weight (r^2 = 0.76, P < 0.001), neither showed a strong inverse relationship to littersize born (r^2 = 0.12; P = 0.12; r^2 = 0.17; P = 0.05), suggesting that uterine capacity had only a moderate effect on intra-uterine development. However, as brain:liver weight ratio, an indicator of IUGR, showed a negative correlation with mean piglet birth weight (r^2 = -0.48; P < 0.001), and a positive correlation with litter size at term (r^2 = 0.35; P = 0.003), intra-uterine growth retardation, measured by changes in brain:liver weight ratio, appears to have been influenced by the intra-uterine environment to a greater extent than birth weight. The results of the current study indicate that even in the absence of extreme uterine crowding, a "brain sparing" effect occurs in lower birth weight neonates. Therefore, other aspects of fetal growth such as muscle fibre development, may also be affected.

Key Words: Swine, Uterus, Development

798 Estradiol benzoate (EB) delays new follicular wave emergence in a dose dependent manner after ablation of the dominant follicle in the ovaries of cattle. C.R. Burke*[12], M.L. Mussard[1], and M.L. Day[1], [1]*The Ohio State University, Columbus OH,* [2]*Dexcel Research Ltd, Hamilton, New Zealand.*

Estradiol benzoate (EB) induces atresia of the dominant follicle (DF) on the ovaries of cattle when progesterone is elevated. Reduction of estrogenic function in the DF occurs within 36 h, but emergence of the new follicular wave is typically observed 3 to 5 d after EB is administered. We tested the hypothesis that EB delays emergence of a new follicular wave in a dose dependent manner, independent of the status of the DF. At 6.4 ± .2 d after ovulation, all follicles ≥ 5 mm in diameter were aspirated in 26 postpartum cows, and animals immediately received 0, 1, 2 or 4 mg EB/500 kg BW by i.m. injection (n=6 or 7/group). Ovarian structures were monitored daily by ultrasonography from the d before aspiration to emergence of a new follicular wave. Blood samples were collected every 8 h to measure changes in concentrations of FSH. The time to peak FSH was defined as the interval from aspiration to the time of maximal FSH concentration. Time to peak FSH was 29.3 ± 4.0 h, 53.3 ± 4.5 h, 81.1 ± 15.5 h and 91.4 ± 8.2 h for the 0, 1, 2 or 4 mg EB treatments, respectively. Time to new follicular emergence was 1.5 ± .22 d, 3.3 ± .3 d, 4.0 ± .6 d and 4.4 ± .4 d, respectively. Peak FSH and new wave emergence occurred earlier (P<.05) in the 0 than in the 1, 2, or 4 mg EB treatments. These variables were similar among the 1 and 2 mg EB, and longer (P<.05) in the 4 mg EB when compared to the 0 or 1 mg EB treatments. The interval from peak FSH to new wave emergence was 15.7 ± 3.3 h and was not affected by treatment. Treatment with EB maintained the basal concentrations of FSH present during follicular dominance, and in a dose dependent manner, delayed the surge in FSH that stimulates new follicular development. These results show that the dose of EB, rather than the timing of atresia in the DF, determines the timing of new follicular emergence that follows treatment with EB.

Key Words: Estrous syncronization, Follicular development, Estradiol

799 Metabolic and endocrine risk factors for repeat breeder cows. N. Moss[1,2], I.J. Lean*[1,2], S.W.J. Reid[3], and D.R. Hodgson[2], [1]*Bovine Research Australasia,* [2]*University of Sydney,* [3]*University of Glasgow.*

A prospective cohort study was used to investigate interactions between metabolic and endocrine factors at first insemination and conception requiring > 1 insemination (CONC>1). Holstein cows (n = 709, of which 224 were primiparous; 485 multiparous) from 7 non-seasonal calving herds in NSW and 3 seasonal calving herds in Victoria, Australia were enrolled. Herds were principally pasture-fed, supplemented with concentrates and conserved forages. Mean milk production at first service was 30.5 L (inter-herd range 24.5-36.5 L). Biographic and disease data were collected. Cows were body condition scored within 10 days before calving and again at first insemination. Cows were blood sampled at first insemination. Serum albumin, total protein, calcium, phosphorus, urea, NEFA, cholesterol and β-hydroxybutyrate (BHBA) and plasma concentrations of glucose, progesterone and LH were determined. Pregnancy was determined 45-75 days after last insemination.
First service conception rate was 53.6% and did not significantly differ between primipars and multipars, and seasonal and non-seasonal systems. Univariable logistic regression revealed increases in risk (P<0.05) of CONC>1 with low serum cholesterol <4.2mM/L (n=149); low albumin <31g/L (n= 119); low glucose < 3.7mM/L (n=500); higher BHBA concentrations; shorter calving to first service interval, conception requiring >2 inseminations in the previous lactation (n=127); higher BCS at calving; dry period >99 days (n=53); post partum disease (n=87); and progesterone >1ng/mL (n=40). Multivariable logistic regression with herd fitted as random effect, revealed relationships (P<0.05) between CONC>1 and low cholesterol (odds ratio(OR)=1.60 (95%CI 1.1-2.4)); low albumin (0R=1.91 (95%CI 1.3-2.9)); rising BHBA(β= 0.1592); shorter calving to first service interval (β=-0.01); dry period >99 days (OR=2.0 (1.0-3.8)); post partum disease (OR=1.71(1.1-2.8)) and progesterone >1ng/mL (OR=2.4 (1.2-4.8)). This study supports associations between negative nutrient balance during early lactation and CONC>1, the negative effects of disease and previous poor fertility on risk of repeat breeding.

Key Words: Repeat Breeder, Nutrient Balance, Epidemiology

800 Use of quantitative milk progesterone testing in lactating dairy cows for determination of post calving cyclicity, estrus detection, and pregnancy diagnosis. J.D. Ferguson[1], D.T. Galligan[1], J.W. Brooks*[2], G. Azzaro[2], S. Ventura[2], and G. Licitra[3], [1]*University of Pennsylvania,* [2]*Consorzio Ricerca Filiera Lattiero-Casearia, Ragusa, Italy,* [3]*University of Catania, Italy.*

The objective was to evaluate the use of a quantitative milk serum progesterone (P4) test in determining post partum cyclicity, accuracy of estrus detection, and pregnancy diagnosis. Milk samples from 11 farms were analyzed for serum P4 concentration by ELISA over a 4 month period. Samples were collected at weekly intervals from lactating dairy cows from 4 to 7 weeks after calving. A threshold value of 300 pg/ml was used for segregation of samples into "low" or "high" P4 concentration. Cycling status was determined by analysis of P4 profiles of 611 samples from 166 cows. Profiles that corresponded to the presence of a functional CL were considered to indicate cyclicity. Among all post partum cows 56.6% (94/166) were cyclic by 7 wks and 19.9% (33/166) acyclic with the remaining 23.5% (39/166) undetermined. Upon insemination a second series of samples was collected at each insemination, and at 21 d and 42 d after the most recent insemination. Rectal palpation for pregnancy was performed twice for each cow not returning to estrus at 35-41 d and 56-62 d after insemination. At insemination (n = 684) the test, when correlated with pregnancy status, had a sensitivity for detection of estrus ($\leq$300 pg/ml) leading to pregnancy of 93.2% and a specificity of 13.5%. As a pregnancy test at 21 d and 42 d (n = 448 and 185) the test had a sensitivity for detection of a functional CL (>300 pg/ml) of 95.4% and 98.0% and a specificity of 49.5% and 49.1% respectively. Thus, for determination of estrus and pregnancy the test functions well given a negative result, that is high P4 at insemination or low P4 at 21 d or 42 d post insemination. However, a positive result has very little predictive value (28.8% and 51.7% at 0 d and 21 d) until 42 d (77.4%) requiring that all animals be presented for manual pregnancy diagnosis after testing positive. The test functions well for determining post calving cycling status.

Key Words: P4, Cycling status, Pregnancy test

801 The Effect of Dexamethasone to Prevent Induced Luteolysis in Holstein Heifers . M Mohammadsadegh*[1], P Hovareshti[2], M Bolourchi[2], and I Noroozian[2], [1]*Faculty Of Vet. Med., Azad Univ. of Garmsar,* [2]*Faculty of Vet. Med., Tehran Univ.*

To study the effect of dexamethasone to inhibit corpus luteum regression in Holstein heifers, 17 animals, at 15 to 17 month of age and 340 kg mean body weight were synchronized for estrus by two intramuscular injections of a naturally occurring PGF2a (25 mg PGF2a - Tham. salt, Lutalyse, Upjohn Co.USA) at 14 days interval and were studied in consecutive cycle,first as a control and then as a test group . Heifers were treated by 15 mg of a placebo and 25 mg of PGF2a on days 8 and 9 of the induced estrous cycle respectively and served as a control group. All the heifers showed estrous 2 to 6 days later and then treated by 15 mg dexamethasone sodium-phosphate (Colvasone, Norbroke Co.England) and 25 mg PGF2a on days 8 and 9 of the second estrous cycle respectively and served as a test group. Blood samples were collected on days 8 and 13 of the cycle to assay serum progesterone levels. Estrous detection and rectal palpation of the corpora lutea were established from days 8 to 13 of the cycle. The results showed that in the control group active corpora lutea were present and progesterone levels were high (> 1ng/ml) on day 8 of the cycle. However, the corpora lutea regressed and the progesterone levels decreased (<0.5 ng/ml) on day 13. In the test group, corpora lutea regressed in 11 heifers but the active corpora lutea were palpated in 6 heifers on day 13 with high progestrone levels (> 1ng/ml). It was concluded that the injection of dexamethasone, 24 h before the injection of PGF2a on day 9 of the estrous cycle did not inhibit luteolysis in 64.7 % of treated heifers and failuer of lutolysis was encounterd only in 35.3% of the heifers.Dexamethasone inhibited significantly luteolytic activity of Dinaprost (p< 0.01).

Key Words: Dinaprost, Dexamethasone, Luteolysis

802 Repeated exposure to novel females enhances sexual behavior of bulls. J.D. Bailey*, J.D. Rhinehart, L.H. Anderson, and K.K. Schillo, *University of Kentucky, Lexington, KY.*

The objective of this experiment was to determine the effect of novel females on sexual behavior of beef bulls. According to a latin square design, 4 Angus bulls (BW=557 $\pm$ 17 kg) were exposed to 4 treatments over 4 test periods, each consisting of 4, 1-hour behavior tests. Treatments included: 1) consecutive exposure to 4 estrual heifers, 2) alternating exposure to 2 estrual heifers, 3) continuous exposure to 1 estrual heifer, and 4) continuous exposure to 1 diestrus heifer. During each test, heifers were unrestrained. Before the experiment, 10 heifers (BW=441 $\pm$ 11 kg) received melengestrol acetate (7d) and 25 mg (i.m.) of PG (d 7). Forty-eight and 24 hours before each period, respectively, 7 heifers received 25 mg (i.m.) of PG and 1 mg (i.m.) of estradiol cypionate. Heifers designated as estrual were observed to participate in homosexual mounting and bulls were allowed to observe this behavior for 4-6 hours before testing. Behavior was recorded and quantified using 4 surveillance cameras interfaced with a duplex-multiplexer and a 24-hour, real-time videocassette recorder. Mounts with intromission averaged 3.3, 2.6, 1, and $0 \cdot hr^{-1}$ for bulls in treatment 1, 2, 3, and 4, respectively. Bulls exposed to 4 different estrual heifers exhibited more mounts with intromission ($P < 0.01$) and more flehmen responses ($P < 0.02$) compared to other treatments. Bulls that were paired with a diestrus female for 4 hours had fewer mounts with intromission ($P < 0.01$) and tended ($P = 0.06$) to have fewer flehmen responses than other treatments. Bulls receiving alternating exposure to 2 estrual heifers exhibited more ($P < 0.01$) mounts with intromission compared to bulls continually exposed to 1 estrual heifer. Aborted mounts tended ($P = 0.07$) to decrease linearly ($P = 0.05$) over time, independent of treatments and test period. These data demonstrate that bull sexual behavior is enhanced by novel females when bulls are allowed to interact with unrestrained females.

Key Words: Sexual behavior, Mounting, Intromission

803 Effect of Hormone Addition to Semen on Backflow, Sperm Reservoir, Uterine Contractions and Fertility following AI in Pigs. K.L. Willenburg*, G.M. Miller, and R.V. Knox, *University of Illinois.*

Hormone addition to semen has been used to minimize situations of low fertility. Therefore, the following experiment utilized a low fertility model to evaluate its mode of action. Twenty-four hours after the onset of estrus a low dose ($0.5x10^9$ sperm/ 80 ml) single AI containing

no hormone, estrogens (5 mg 17-beta estradiol, 4.5 mg estrone sulphate, and 2 mg estrone), 5 mg PGF_{2alpha} (Lutalyse#), or 4 I.U. of oxytocin was evaluated on backflow, the sperm reservoir, uterine contractions, litter size (LS) and pregnancy rate (PR) in gilts. In experiment 1-3 all hormone treatments and AI procedures were identical. In experiment 1, backflow of semen from the uterus was collected continuously for 8 h after AI. Pregnancy rate and litter size were assessed at 25 d. In experiment 2, backflow was collected as in experiment 1 and the tracts were also flushed to determine sperm numbers in the distal part of uteri and oviduct. In experiment 3, sows were monitored for uterine contractions 1 h before AI and for 2 h after AI. In experiment 1, the average volume of semen (70 $\pm$ 1.0 ml) and number of sperm (2.1 $\pm$ 0.1 x 10^8) expelled from the uterus were not different for any of the treatments. The average PR (60%) and LS (10.8) were also not influenced by hormone addition. There was a trend for the increased number of sperm in the uteri of hormone treated animals (6.0 $\pm$ 1.3 x 10^4) compared to the controls (2.2 $\pm$ 1.3 x 10^4, P = 0.1) but there was no difference in sperm in the oviducts (3.2 $\pm$ 1.3 x 10^4). Within 0.5 h of AI, there was an increase in the frequency of contractions for the PGF_{2alpha} treatment compared to the other treatments (14.2 vs 6.3 contractions/ 0.5 h, P $<$ 0.05), however there was no difference in amplitude (55 mmHg) or duration (34 sec) of contractions. Overall, hormone addition to semen did not improve fertility compared to the controls despite a situation of low fertility. Therefore, hormone addition may not be an efficient or cost effective strategy to improve reproductive parameters in swine.

Key Words: AI, Hormone supplementation, Pigs

804 A comparison of the determination of bull sperm concentration and motility using IVOS®, Optibreed® and traditional techniques. Alana Cent*[1], Peter Chenoweth[1], Alice Lee[2], and Duane Steffey[2], [1]*Department of Clinical Sciences, College of Veterinary Medicine, Kansas State University,* [2]*Statistical Consulting Center, San Diego State University.*

Traditional microscopic estimations of sperm motility and concentration lack objectivity, repeatability, and standardization. This work compared newer technologies for semen analysis which promise greater objectivity, namely CASA (IVOS®) and Optibreed®, with more traditional microscopic, hemocytometric and spectrophotometric techniques. Here, the hemocytometer was the gold standard for sperm concentration (4 readings for each aliquot by 2+ technicians) and IVOS for sperm motility (5 scans/aliquot). Fresh bull semen ejaculates (n=3) were pooled on two occasions, incubated at 370C and centrifuged (600 x g for 10 minutes). Seminal plasma was added or removed to create known semen concentrations from 10 million to 2.5 billion sperm/ml. Each semen aliquot of pre-determined sperm concentration (n=52) was evaluated for sperm concentration using IVOS® and Optibreed® as well as by spectrophotometer using established protocols. Each was also evaluated for sperm motility employing IVOS®, Optibreed® and phase-contrast microscopy. Significant relationships occurred between hemocytometric sperm concentration and IVOS® estimations (R^2=.96; P<0.001), Optibreed® (R^2=.97; P<0.001) and spectrophotometer absorbances (R^2=.95; P<0.001). Overall motility was significantly orrelated between IVOS® readings and Optibreed® average channel counts (R^2=.58; P<0.001), being strongest for 0-40% motility (R^2=.65, P<0.001). These findings suggest acceptable relationships between the hemocytometric IVOS® and Optibreed® determinations of sperm concentration. Good relationships occurred between IVOS® motility readings and Optibreed® average channel counts, particularly for lower motility (0-40%) samples. Supported in part by NIH Short Term Training Grant and Alpharma Animal Health Division.

Key Words: CASA, Optibreed®, IVOS®

805 Effects of osmotic stress and bovine serum albumin on sperm motion characteristics and plasma membrane integrity in boars. H. D. Guthrie*[1], G. R. Welch[1], and J. R. Critser[2], [1]*Germplasm and Gamete Physiology Lab, ARS, USDA, Beltsville, MD 20705,* [2]*Comp. Med. Ctr, Res Anim Diagnostic Lab, College of Vet. Med., Univ Missouri, Columbia, MO 65211.*

The cell volume excursion associated with exposure to hypo-and hyperosmotic environments causes irreversible loss of motility and substantial increased death among porcine spermatozoa. The purpose of this experiment was to determine the effects of osmotic stress and bovine serum albumin (BSA) treatments on sperm viability and motion characteristics. Semen from ten boars, extended in Beltsville Thawing Solution, was incubated at 38 C for five min in phosphate-buffered saline (PBS) with or without 0.3% BSA at final osmolalities ranging from 80 to 1170 mOsmoles/kg (mOsm) and then returned to isosmotic conditions. The percent motile sperm (MOT) and measures of sperm motion were determined using a Hobson Sperm Tracker, and the proportion of sperm cells with plasma membrane integrity (PMI) was determined by flow cytometric analysis of the fluorescence of the nuclear stains SYBR-14 and propidium iodide. MOT decreased significantly P $\leq$ 0.05) as osmolality of sperm treatments decreased or increased outside of a range of 290 to 340 mOsm. PMI and motion parameters were more osmotically tolerant than MOT showing a low incidence of statistically significant change in the range of 290-430 mOsm. The presence of BSA in the anisosmotic PBS solutions was capable of reducing the loss of motility increasing MOT by 13-14 percentage points to 75.3% and at 290 mOsm and 78.2% at 340 mOsm, and increased the following sperm motion parameters: curvilinear velocity (15%), average path velocity (26%), straight line velocity (60%), beat cross frequency (33%), and percent straight line distance (33%) in the range of 215-430 mOsm. The presence of BSA had no significant effect on PMI or amplitude of lateral head displacement. While hypo- and hyperosmotic stress kills many boar spermatozoa, a subpopulation in each ejaculate was capable of maintaining viability and normal motion characteristics.

Key Words: Sperm Motility, Osmotic Stress, Plasma Membrane Integrity

806 The effects of winter photoperiod and rate of body weight gain on serum prolactin, puberty and first service pregnancy in spring-born beef heifers. J. A. Small*[1], N. D. Glover[1], and A. D. Kennedy[2], [1]*Agriculture & Agri-Food Canada,* [2]*University of Manitoba.*

Gelbvieh sired crossbred heifers (n=143) were assigned on the basis of age (192$\pm$16 d) and body weight (235$\pm$20 kg) at fall weaning to one of four treatment groups (NC, NS, EC, ES) in a 2*2 factorial layout of natural (N) and extended (E) winter photoperiod (P) and constant (C) and stepped (S) body weight gain (G) treatments that were initiated 36 d after weaning (Day 0). One of two similar winter housing facilities consisting of a south facing shed and drylot was equipped with high-pressure sodium lamps to provide pens with supplemental light (320 lux 1 m above ground). The other facility had no lighting or exposure to spill over light. From December 21 to March 21 (Days 28 to 112), when natural photoperiod increased from 7 to 12 h, the lights were programmed to turn on 1/2 h before sunset and turn off after completion of a 16 h photoperiod which included a 1/2 h simulated twilight. Rations were formulated for heifers to achieve 60% of mature weight at first service; however constant (0.9 kg/d; Days 0 to 168) and stepped (0.6, 0.9 and 1.2 kg/d Days 0 to 56; 56 to 112 and 112 to 168, respectively) rates of body weight gain were achieved by adjusting the amount of barley silage and chopped grass hay in a total mixed ration that was offered once daily. Estrus detection was conducted twice daily and ovulation confirmed by serum progesterone. Body weight, backfat thickness and prolactin were measured every 28 d. On Day 168 estrus synchronization was initiated for timing insemination (AI) after Lutalyse. Prolactin, body weight, backfat and confirmed estrus showed significant (P<0.05) interaction among P, G and Day primarily because of differences among treatment groups that occurred between Days 56 and 112, especially at the midpoint on Day 84. At this time prolactin was higher for E than N (19.6 vs 3.3 ng/mL), especially ES; body weight and backfat were lower for S than C (320 vs 333 kg and 1.7 vs 2.2 mm), especially for ES, and confirmed estrus was higher for E than N (33.3 vs 22.2%). Although by Day 168, body weight, backfat and confirmed estrus did not differ among treatment groups, AI pregnancy rate was higher for E than N (51.4 vs. 30.9%; P < 0.05). Photoperiod can be used to facilitate puberty in heifers at a lower body weight and fatness.

Key Words: Photoperiod, Puberty, Heifer development

807 Evidence Against Lamprey GnRH-III as the Mammalian FSH-Releasing Hormone. M. Amstalden*[1,2], D.A. Zieba[1,2], M.R. Garcia[1,2], P.J. Bridges[3], R.L. Stanko[1,4], T.H. Welsh, Jr.[2], J.E. Fortune[3], Hansel W.H.[5], and G.L. Williams[1,2], [1]*Texas A&M University Agricultural Research Station, Beeville, TX* , [2]*Texas A&M University, College Station, TX,* [3]*Cornell Universtiy, Ithaca, NY,* [4]*Texas A&M University-Kingsville, Kingsville, TX,* [5]*Pennington Biomedical Research Center, Baton Rouge, LA.*

It is generally accepted that both mammalian gonadotropins, FSH and LH, are regulated by the hypothalamic peptide, GnRH. However, FSH secretion is less dependent upon GnRH and, in addition to the regulatory influence of ovarian hormones, has been postulated to be controlled by a separate FSH-releasing hormone (FSHRH). Since several reports in rodents and one in cattle suggest that lamprey GnRH-III (lGnRH-III) can selectively stimulate the release of FSH, it has been proposed as a putative mammalian FSHRH. To test the hypothesis that lGnRH-III can selectively stimulate the release of FSH in cattle, we performed 3 experiments. In experiment I, anterior pituitaries from two steers were collected at slaughter and cells were dispersed, plated, and cultured for 5 d. Cells in three independent replications were treated for 4 h with either media alone (control), media containing GnRH (10^{-9}, 10^{-8}, 10^{-7}, and 10^{-6} M), or media containing lGnRH-III (10^{-9}, 10^{-8}, 10^{-7}, and 10^{-6} M). All doses of GnRH increased (P<.001) release of LH and FSH. However, only the two highest doses of lGnRH-III stimulated (P<.001) a non-selective release of FSH and LH. In experiment II, seven ovariectomized, mature cows, each bearing an estradiol implant to maintain serum estradiol concentrations at 2-4 pg/ml, were injected i.v. with each of the following treatments in a Latin Square design: Saline Control; GnRH (0.055, 0.11, and 0.165 μg/kg); lGnRH-III (0.055, 0.11, and 0.165 μg/kg). All doses of GnRH induced (P<.001) release of both LH and FSH. However, none of the lGnRH-III doses tested stimulated release of LH or FSH. To determine whether higher doses of lGnRH-III would stimulate release of gonadotropins in vivo, two mature heifers were injected i.v. with either 1 or 5 mg of lGnRH-III during the follicular phase of a synchronized estrous cycle. Lamprey GnRH-III induced a surge release of LH in both heifers, which resulted in ovulation of the largest follicle in the absence of a detectable increase in plasma FSH. In summary, we found no evidence for selective release of FSH by lGnRH-III under the experimental conditions tested and the potency of lGnRH-III to release both gonadotropins was lower than that of GnRH.

Key Words: Lamprey GnRH-III, FSH, LH

808 Serum estradiol and FSH concentrations in lactating sows before and after ovariectomy. C. J. Bracken*, B. L. McCormack, R. P. Radcliff, T. C. Cantley, and M. C. Lucy, *University of Missouri, Columbia MO.*

The factors affecting follicular growth and the variation in weaning to estrus and weaning to ovulation intervals in sows are poorly understood. The objective was to measure serum concentrations of estradiol and FSH in lactating sows before and after ovariectomy and to correlate estradiol and FSH concentrations with ovarian follicular development. The posterior vena cava anterior to the ovarian vein was cannulated via the saphenous vein in 20 sows at 8.9 ± 0.4 d post-farrowing. Blood samples were taken thrice daily (0700, 1500, and 2300 h) beginning on the day of cannulation and continuing for 48 h after ovariectomy (16.6 ± 0.7 d post-farrowing). Serum concentrations of estradiol and FSH were measured by validated radioimmunioassay. Transrectal ovarian ultrasonography was performed once daily for follicle measurement and continued until ovariectomy. Ovariectomies were performed based upon stage of follicular development (2 to 5 mm follicle diameter). There was an effect of time (P<0.001) relative to ovariectomy on serum FSH because serum FSH increased after ovariectomy (4.5 ± 0.2 ng/ml to 6.7 ± 0.4 ng/ml). A sow by time interaction was also detected for FSH (P<0.001) because 4 of 20 sows did not have greater FSH after ovariectomy. Serum FSH concentrations before ovariectomy were not correlated with average follicular diameter or serum estradiol concentrations. There was an effect of sow (P<0.001) on serum estradiol concentrations but serum estradiol concentrations before (4.1 ± 0.3 pg/ml) and after (3.5 ± 0.6 pg/ml) ovariectomy were similar and the sow by time interaction was not significant. Serum estradiol concentrations before ovariectomy tended to be positively correlated with follicular diameter (r^2=0.13; P<0.10). We conclude that FSH secretion in most lactating sows is controlled by an ovarian negative feedback loop. The estradiol in serum of lactating sows arises from both ovarian and nonovarian sources and changes in FSH after ovariectomy are not dependent on a change in serum estradiol.

Key Words: FSH, estradiol, sow, ovariectomy

809 Effects of Treatment With LH or FSH Between 4 To 8 Weeks of Age on The Attainment of Puberty In Bull Calves. ET Bagu*[1], S Madgwick[2], R Duggavathi[1], PM Bartlewski[3], DMW Barrett[1], S Huchkowsky[1], S Cook[1], and NC Rawlings[1], [1]*Department of Veterinary Biomedical Sciences, University of Saskatchewan.,* [2]*Department of Agriculture, University of Newcastle.,* [3]*Department of Obstetrics, Gynecology and Reproductive Sciences, University of Saskatchewan.*

In bull calves increase in gonadotropin secretion between 6 and 20 wks of age is probably critical for the onset of puberty. In this study, to try and hasten the onset of puberty, calves were injected (sc) 3 mg of bLH (n=6) or 4 mg of FSH (n=6) once every 2 d, from 4 to 8 wks after birth, and control calves received saline (n=12). Scrotal circumference (SC) and body weights were measured bi-weekly from birth to puberty (SC ≥28 cm) and blood samples were collected every 15 min for 10 h, at 4 and 8 wks of age and then every 6 wks until puberty. Mean serum FSH concentrations, at 4 and 8 wks of age were significantly higher (P<0.001), in the FSH treated (1.94±0.06 and 1.08±0.04 ng/ml) as compared to LH treated (0.74±0.01 and 0.62±0.01 ng/ml) and control calves (0.53±0.10 and 0.46±0.01 ng/ml, respectively). Mean LH concentrations were significantly higher (P<0.001) in the LH- (2.28±0.32 ng/ml) as compared to FSH- (0.82±0.07 ng/ml) treated and control calves (0.60±0.07 ng/ml) at 4 wks of age. There was no significant difference (P>0.05) in the mean weight gain among the groups but SC was greater (P<0.05). Calves were electroejaculated every 2 wks at SC ± 26.5 cm, ejaculates of ± 50 million sperms/ ml with progressive linear motility > 10% were obtained earlier (P<0.05) in FSH treated (44.3±2.7 wks) compared to control calves (48.2±3.9 wks of age). In conclusion, treatment of bull calves with FSH, starting before the early postnatal increase in gonardotropin secreation, hastened the onset of puberty.

Key Words: Puberty, Luteinising Hormone (LH), Follicle Stimulating Hormone (FSH)

810 Luteinizing hormone (LH) release during the pre-ovulatory period, in two strains of Holstein-Friesian cows being fed two different diets. S Meier*[1], S Morgan[1], J Fahey[2], E Kolver[1], and G Verkerk[1], [1]*Dexcel Limited, Hamilton, New Zealand,* [2]*VIAS, Werribee, Victoria, Australia.*

This study examined the release of luteinizing hormone, during the pre-ovulatory period of the oestrous cycle, of 2 strains of Holstein-Friesian (HF) cows fed different diets. Two strains of HF cows, New Zealand (NZ) Friesian (>77.5% NZ genetics) and international (100% non-NZ genetics; OS) were fed either ryegrass and white clover pasture system (Grass) or total mixed ration (TMR; 1). The size of ovarian structures was estimated by daily transrectal ultrasound during one oestrous cycle. Four hourly blood sampling began when the CL declined in the presence of a pre-ovulatory follicle and continued until ovulation. Samples were collected using a jugular catheter. Samples were assayed for LH with the inter- and intra-assay coefficient of variations of <12% and <19% for reference samples. The sensitivity of the assay was 0.1 ng/ml. The time from the start of the 4 hourly sampling to ovulation was 4.0±0.3 days, with a range of 3 to 8 days. Average size of CL prior to the 4 hourly sampling was 23.1±0.6 (range 28 to 18 mm). The 4 hourly sampling started when the CL decline to 18.5±0.6 mm (range 25 to 14 mm). Peak LH did not differ between strain and feeding regimes (NZ 11.6±1.6 ng/ml, OS 9.9±1.3 ng/ml, P=0.28; Grass 12.4±1.8 ng/ml, TMR 9.4±1.0 ng/ml, P=0.13). However, within the NZ strain the LH peak was as higher in NZG than NZT (15.0±3.0 ng/ml; n=6; and 9.3±1.3 ng/ml; n=7; respectively, P<0.05). The OS groups were similar (OSG: 10.2±2.0 ng/ml; n=7, and OST: 9.6±1.7 ng/ml; n=6). The area under the curve (AUC) across the 12 hours before and after the LH peak, did not differ between breed or diet. These results suggest that LH concentrations around ovulation be influenced by diet.

1. Kolver et al., 2000. Pages 265-269 in Proc. New Zealand Soc. Anim. Prod. Hamilton, New Zealand.

Key Words: LH, pre-ovulatory, bovine