**W352 Heat stress affects the intestinal temperature in growing pigs.** N. Arce, M. Cota, B. A. Araiza, M. Cervantes, and A. Morales*, *Instituto de Ciencias Agrícolas, UABC, Mexicali, BC, México.*

High ambient temperature (°T) may increase the intestinal °T, which might affect the digestive and absorptive functions of the small intestine. This experiment was conducted to analyze the °T in duodenum and jejunum of pigs exposed to practical daily variations in ambient °T (22 to 41°C) and fed a commercial diet. Two pigs (19 ± 1.8 kg BW) were surgically implanted with thermographs in duodenum and jejunum. Pigs were individually housed in 1.2 × 1.2 $m^2$ raised-floor pens, under heat stress (HS) in a room with no climate control during 4 d, followed by other 4 d in a room with a thermostat set up at 22 ± 2°C (Comfort). Intestinal °T was recorded at each intestinal segment every 15 min for 4 d (24 h-periods) under HS or Comfort; room °T was recorded with the same frequency. Feed was equally provided 6 times daily at 0600, 0900, 1200, 1500, 1800 y 2100 h. Purified water (31.4°C and 23.9°C for HS and Comfort room) was freely available. Average feed intake was 930 and 1,070 g/d for HS and Comfort pigs, respectively. Correlation analyses between ambient and intestinal °T were performed. Minimum, average, and maximum °T in the HS room were 26.1, 31.2, and 37.1°C, respectively; the average Comfort room °T was 24.3°C. Lowest and highest intestinal °T were: HS: duodenum, 39.0, 40.3; jejunum, 39.1, 40.5; Comfort: duodenum, 38.5, 39.3; jejunum, 38.6, 39.4°C, respectively. Correlation coefficients for room and duodenal or jejunal °T at each 24-h period (P) in HS pigs were: Duodenum, P1, 0.81 ($P < 0.01$); P2, 0.80 ($P < 0.01$); P3, 0.83 ($P < 0.01$); P4, 0.75 ($P < 0.01$); Jejunum, P1, 0.75 ($P < 0.01$); P2, 0.79 ($P < 0.01$); P3, 0.88 ($P < 0.01$); P4, 0.79 ($P < 0.01$). In HS pigs, the °T in duodenum was highly correlated (r = 0.91) with that in jejunum ($P < 0.01$). There was a positive correlation between room and duodenal (r = 0.81) or jejunal (r = 0.76) °T ($P < 0.01$) of HS pigs. Room °T of HS pigs showed an S-type curve with the lowest value between 0500 and 0700, and the highest between 1400 and 2000 h, which was mirrored by the °T recorded in both duodenum and jejunum. In conclusion, high ambient °T increases the °T in the small intestine, which in turn may affect the digestive and absorptive functions of HS pigs

**Key Words:** pig, heat-stress

**W353 Energy supplementation effect on follicular population and gonadotropin plasma concentration in prepubertal Nellore heifers.** M. C. Miguel*, H. Costa, J. Souza, R. Cipriano, J. L. Delfino, D. Giraldo, N. Romanello, D. Oliveira, M. A. Maioli, S. P. Gobbo, D. Pinheiro, and G. Nogueira, *Sao Paulo State University (UNESP), Aracatuba, Sao Paulo, Brazil.*

The objectives were to study nutritional influences on follicle population and gonadotropin concentration in prepubertal Nellore heifers. Calves at 5 d of age were assigned to 2 diets, 3% of body weight as ground corn (n = 8) or control with no supplement (n = 8). Ground corn was offered daily until weaning. Every 4 d, from 15 d of age until weaning, the diameter of the largest follicle and number of follicles were evaluated and venous blood sample collected. Data were analyzed by ANOVA with the mixed procedure of SAS for repeated measures. The diameter of the largest follicle increased ($P < 0.0001$) from 1 to 5 mo of age in both corn supplemented (2.2 ± 1.6 mm to 6.1 ± 1.5 mm) and control heifers (1.5 ± 0.9 mm to 5.3 ± 0.7 mm). Heifers supplemented with corn had greater larger follicle diameter ($P = 0.006$; 5.1 ± 2.2 mm vs. 4.1 ± 1.9 mm) and larger number of follicles than controls ($P = 0.0461$, 30.3 ± 9.2 vs. 29.6 ± 8.7). Corn supplementation increased average concentration of LH ($P = 0.06$, 0.43 ± 0.33 ng/mL vs. 0.35 ± 0.29 ng/mL). In both treatments, LH increased according to age and concentrations were greatest on the mo 2, 4, and 5 of age. In control heifers, FSH concentration was greater at mo 1 and 2 of age, whereas in heifers supplemented with corn, concentrations of FSH were greater on mo 4 and 5 of age. Young prepubertal heifers can be used as a model to study follicle population, and supplementation with ground corn influenced concentrations of LH and FSH and enhanced follicle growth in Nellore heifers in the first 5 mo of age.

**Key Words:** prepubertal Nellore calf, largest follicle diameter, feed supplementation

**W354 Calf fetal nutrition in grasslands: Muscle fiber characteristics and gene expression at birth.** M. Carriquiry*, V. Guiterrez, P. Machado, A. L. Astessiano, and A. C. Espasandin, *Facultad de Agronomia, UDELAR, Montevideo, Uruguay.*

The aim of this study was to determine the effect of nutrition during fetal life and dam genotype on calf BW, plasma IGF-I, and muscle characteristics and gene expression at birth. Forty crossbred calves and their dams (purebred-PU: Hereford and Angus, and crossbred-CR: F1) were used in a randomized block design with a factorial arrangement of herbage allowance of native pastures (High: Hi-HA and Low; Lo-HA, 4 vs. 2.5 kg dry matter/kg BW) and dam genotype (PU vs. CR). Blood and Semitendinous muscle samples were collected at birth to measure gene expression by SYBR-Green real time PCR using ACTB and HPRT as internal control genes. Data were analyzed with a mixed model including herbage allowance, dam genotype, their interaction and calf sex as fixed effects and block as a random effect. Calf BW at birth (39.8 ± 2.6 kg) and Semitendinous muscle fiber diameter (43.7 ± 1.7 μm) did not differ due to herbage allowance or dam genotype but muscle fiber density was less ($P < 0.05$) in Lo-CR offspring than other calf groups ($5.5 \times 10^{-4}$, $5.6 \times 10^{-4}$, $6.0 \times 10^{-4}$ and $4.2 \times 10^{-4} \pm 0.7 \times 10^{-4}$ fiber/$\mu m^2$ for Hi-PU, Lo-PU, Hi-CR, Lo-CR, respectively). Plasma IGF-I (165 vs. 145 ± 11 ng/mL) and muscle IGF1 mRNA were greater ($P \leq 0.04$) in Hi-HA than Lo-HA offspring (1.20 vs. 0.66 ± 0.06). Muscle expression of IGFBP3, IGFBP5 and IGF1R mRNA tended ($P < 0.09$) to be greater in CR than PU offspring (1.0 vs 0.52 ± 0.20, 0.98 vs. 0.64 ± 0.19, 1.0 vs. 0.66 ± 0.12, respectively). Muscle expression of PPARγ mRNA was greater ($P = 0.02$) in Hi-HA than Lo-HA offspring (0.54 vs. 0.34 ± 0.08) but SREBF1 mRNA did not differ among calves. High herbage allowance of native pastures offered to beef dams during gestation would increase calf plasma IGF-I and muscle IGF1 and PPARγ mRNA expression at birth, which could increase growth and muscle adipogenesis potential. In addition, CR offspring had an increased mRNA expression of IGF system components in muscle.

**Key Words:** fetal programming, beef cattle, grazing

**W355 Changes in plasma leptin in newborn and postnatal beef calves.** N. M. Long*[1] and D. W. Schafer[2], *[1]Department of Animal and Veterinary Science, Clemson University, Clemson, SC, [2]Department of Animal Science, University of Arizona, Tucson.*

Changes in neonatal plasma leptin play a central role in regulating development of the hypothalamic appetite control centers in rodents. A postnatal leptin surge has been shown in lambs. Maternal obesity and overfeeding initiated before conception and maintained throughout

gestation blocks this leptin surge in newborn lambs. The presence, timing and duration of a neonatal leptin peak have not been established in bovine neonates. To investigate this, 12 nulliparous cows giving birth to 6 bull and 6 heifer calves with no assistance or complication during parturition were chosen for this study. A BCS was determined at calving on all cows. Calves were bled via jugular venipuncture within 2 h of birth and then daily until d 8 and every other day until d 18 of age at 0700 h. Plasma was collected and analyzed for glucose, insulin, cortisol and leptin concentrations via validated colorimetric and radioimmunoassay procedures. Plasma hormone and metabolite values were analyzed as repeated measures using PROC Mixed of SAS. Cow BCS and calf birth weight were analyzed using the PROC GLM of SAS. Cows having bull or heifer calves had a similar BCS at parturition (4.8 ± 0.1; $P = 0.36$). Calf birth weight was similar ($P = 0.90$) between sexes and averaged 31.6 ± 1 kg. Bull calves exhibited elevated plasma leptin concentrations compared with heifers ($P = 0.01$). Further, plasma leptin concentrations increased from birth until d 2 then decreased by d 16 of age ($P < 0.0001$). Plasma cortisol was elevated ($P < 0.0001$) at birth and then decreased over the next 5 d. Bull calves had greater ($P = 0.0431$) plasma insulin than heifer calves. We conclude that there is a postnatal change in plasma leptin that shows clear sex effects with bulls having a greater plasma leptin secretion during the initial neonatal period. These changes in plasma leptin may affect the appetite centers of the hypothalamus and could influence appetite and weight gain in later life and could be a mechanism through which fetal programming acts.

**Key Words:** postnatal calf, plasma leptin, cortisol

**W356 Use of eCG and a progesterone to induce reproductive activity in anestrous goats.** V. Contreras-Villarreal[1], O. Angel-Garcia[1], J. M. Guillen-Muñoz[1], P. A. Robles-Trillo[1], M. A. De Santiago-Miramontez[1], G. Arellano-Rodriguez[1], R. Rodriguez-Martinez[1], M. Mellado[1], C. A. Meza-Herrera[2], and F. G. Veliz*[1], *[1]Universidad Autonoma Agraria Antonio Narro, Toreon, Coahuila, Mexico, [2]URUZA-UACh, Bermejillo, Durango.*

The aim of this study was to evaluate the use of eCG and progesterone as inductors of reproductive activity in anestrous goats. Mixed-breed anovulatory adult goats (n = 16) homogeneous regarding body condition score and body weight were divided into 2 experimental groups (n = 8 each), while 4 mixed-breed bucks were also used. Goats grazed during 7 h daily. Group 1 (IM+eCG) received 25 mg i.m. progesterone and 24h later received 250 IU eCG i.m. Group 2 (Esp+eCG) were treated during 7d with an intravaginal sponge impregnated with 20 mg cronolone (a progestin); at the time of sponge removal, goats received 250 IU eCG i.m. At the time of eCG administration, females were penned during 5d, and were fed with alfalfa hay ad libitum. Estrus activity was evaluated by introducing a male in each group of females during 15 min (morning and afternoon). Females displaying estrus activity were placed in a different pen with 2 males. Follicular activity was evaluated by transrectal ultrasonographic scanning (TUS) from −7d up to +7d regarding eCG administration. Forty-five days after estrus detection, goats were evaluated for pregnancy by TUS. Number and size of ovulatory follicles and size of corpus luteum for each group were compared with a Student *t*-test, while percentage of females displaying estrus, ovulation and pregnancy were compared with a chi$^2$. Reproductive response for both experimental groups is on Table 1. Anestrous mixed-breed goats from northern Mexico (26°N) positively responded to the estrus activity induction with eCG and progesterone, regardless of the administration method (injection or intravaginal sponge), with the use of intravaginal sponge generating an increased corpus luteum size.

**Table 1.** Reproductive response of mixed-breed anestrous goats receiving either i.m. progesterone or intravaginal sponges impregnated with progesterone and eCG.

| | Treatment | |
|---|---|---|
| Sexual response | IM+eCG | Esp+eCG |
| Estrus (no.) | 8/8[a] | 8/8[a] |
| Ovulation (no.) | 8/8[a] | 8/8[a] |
| Pregnancy (no.) | 7/8[a] | 8/8[a] |
| Ovarian follicles (no.) | 1.3 ± 0.07[a] | 1.6 ± 0.02[a] |
| Ovarian follicles size (mm) | 0.75 ± 0.25[a] | 0.82 ± 0.17[a] |
| Corpus luteum size (mm) | 0.89 ± 0.10[a] | 1.20 ± 0.02[b] |

[a,b]Values with different superscript within a row denote differences ($P \leq 0.05$).

**Key Words:** eCG, reproductive activity, goat

**W357 Impact of low body condition score and the time of exposure on the sexual response of female goats to "male effect."** L. I. Vélez[1], J. J. A. Maldonado[1], A. U. Chavez[1], G. J. C. López[2], F. G. Véliz*[3], C. A. Meza-Herrera[4], R. Rodríguez Martínez[3], and G. H. Salinas[1], *[1]INIFAP Laguna, Matamoros, Coahuila México, [2]INIFAP Zacatecas, Calera, Zacatecas México, [3]Universidad Autónoma Agraria Antonio Narro Unidad Laguna, Torreon, Coahuila México, [4]Universidad Autónoma Chapingo Unidad Regional Universitaria de Zonas Aridas, Bermejillo, Durango México.*

The aim of this study was to determine the effect of low body condition score and timing of male exposure on the reproductive response of seasonally anestrous female goats in Comarca Lagunera, Mexico (26°N). Mixed-breed female goats (n = 68) under marginal-range conditions and browsing from 0800 h to 1800 h, were exposed to 8 sexually-active males exposed to an artificial lighting treatment of 2.5 mo of long days, beginning at April 30, 2012. Goats were divided in 2 main groups according to their body condition score (BCS; 1 = emaciated to 4 = very fat). One group of females with a low BCS (1 ± 1) was subdivided as G1 (C1–24; n = 17) and placed in contact with 2 males for 24 h while G2 (C1–14; n = 17) was placed in contact with 2 males only 14 h. Another group depicting regular BCS (2 ± 1) was also subdivided as G3 (C2–24; n = 17) and placed in contact with 2 males for 24 h, while G4 (C2–14; n = 17) was placed in contact with 2 males only 14 h. All groups were 500 m apart from each other in pens of 8 × 4 m. Estrus activity was measured during 15-d. Pregnancy was determined at 40-d from estrus by means of a transrectal ultrasonographic scanning; kidding rate and prolificacy were measured. Percentages of estrus and pregnancy rates were analyzed with chi$^2$, while latency of estrus and prolificacy were determined with a "t" student test (MYSTAL v.10, 2007). Female response with different body condition score and different time of exposure to sexually active bucks is shown in Table 1. While low body condition score decreased the female response to the male effect, a decreased exposure time to males lowered the intensity of estrus in female goats during seasonal anestrous in the Comarca Lagunera.

**Table 1.** Response of females with different body condition score and time of exposure

| | CC | Weight | Estrous | Short-cycle | Latency | Pregnancy | Kidding | Prolificacy |
|---|---|---|---|---|---|---|---|---|
| C1-24 | 1.1[b] | 35.6[b] | 13[b] | 3[b] | 148.3 ± 15.2[b] | 9[b] | 9[b] | 1.2 ± 0.1[a] |
| C1-14 | 1.1[b] | 33.1[b] | 4[b] | 0[b] | 243.0 ± 11.5[c] | 0[c] | 0[c] | 0[b] |
| C2-24 | 2.0[a] | 39.0[a] | 17a | 13[a] | 94.6 ± 7.1[a] | 17[a] | 16[a] | 1.6 ± 0.1[a] |
| C2-14 | 2.0[a] | 41.6[a] | 17a | 9[a] | 94.6 ± 13.5[a] | 15[a] | 12[ab] | 1.3 ± 0.1[a] |

[a–c]Values with different superscripts within variables denote differences ($P < 0.01$).

**Key Words:** male effect, body condition, goat

**W358 Reproductive performance of Holstein cows with retained fetal membranes treated with ceftiofur hydrochloride, 17-β-estradiol, and oxytocin.** R. Solano-Gurza*, M. Mellado, F. G. Veliz, M. A. de Santiago-Miramontes, and J. E. Garcia, *Universidad Autonoma Agraria Antonio Narro, Torreon Coahuila, México.*

Reproductive performance of Holstein cows with retained fetal membranes and subjected to 2 protocols during 3 or 6 consecutive days for the treatment of this disorder was evaluated in a field trial in a dairy operation in a hot environment. A total of 293 pluriparous cows were used. 231 cows diagnosed as having retained placenta (fetal membranes retained for more than 10 h) were assigned to 4 treatment groups. One group received 2.0 mg/kg ceftiofur clorhydrate, 50 mg 17-β-estradiol and 100 IU oxytocin I.M. for 3 consecutive days (CEO-3; n = 63). The second group received the same treatment during 6 consecutive days (CEO-6; n = 48). A third group was treated with ceftiofur clorhydrate and oxytocin for 3 consecutive days (CO-3; n = 68). A 4 group was subjected to the previous treatment during 6 consecutive days (n = 52). The control group (n = 62) was established with cows without retained placenta and consequently with no drugs applied after parturition. Cows were inseminated multiple times, therefore the entire experimental population received 1,098 services (artificial inseminations, and not cow, were the experimental unit). Cow in the CEO-6 group had the lowest ($P < 0.05$) pregnancy per artificial insemination (P/AI; 11.6 (23/199). P/AI for CEO-3, CO-3, CO-6 and control were 18.5 (41/222), 15.4 (39/253), 13.6 (28/206) and 18.8 (41/218), respectively, with no difference among these groups. Services per pregnancy were 3.2 ± 1.9, 4.4 ± 2.3, 3.2 ± 2.3, 4.5 ± 1.9 and 3.6 ± 1.8 (mean ± SD) for CEO-3, CEO-6, CO-3, CO-6 and control, respectively, without differences among groups. Interval between calving and conception (range 132 to 158 d) did not differ among treatments. Results indicate that prolonged (6-d) application of 17-β-estradiol with oxytocin and ceftiofur clorhydrate decreased P/AI. On the other hand, fertility of cows with retained placenta treated with short-term (3-d) application of 17-β-estradiol in combination with oxytocin and ceftiofur clorhydrate was not impaired.

**Key Words:** pregnancy per AI, services per pregnancy, interval calving conception

**W359 Incorporation of sexed semen into reproductive management of range cow-calf operations.** R. F. Cooke*[1], D. W. Bohnert[1], B. I. Cappellozza[1], T. DelCurto[2], and C. J. Mueller[2], *[1]Oregon State University–Eastern Oregon Agricultural Research Center, Burns, [2]Oregon State University–Eastern Oregon Agricultural Research Center, Union.*

The objective was to evaluate pregnancy per AI of lactating beef cows reared in extensive systems and assigned to AI with sexed or conventional semen. Over 2 consecutive years, 896 cows originated from the Oregon State University–Eastern Oregon Agricultural Research Station (Burns location, n = 491 cows, Union location n = 405 cows) received a 100-μg treatment of GnRH and a controlled internal drug releasing device containing 1.38 g of progesterone (CIDR) on d 0 of the study, $PGF_{2\alpha}$ treatment (25 mg) and CIDR removal on d 7, and a second GnRH treatment (100 μg) and fixed-time AI 66 h after the $PGF_{2\alpha}$ treatment. At the Union station, estrus behavior was evaluated between CIDR removal and the second GnRH, and cows were inseminated 12 h after onset of estrus. At the time of AI, cows were assigned to be inseminated with: A) conventional semen (CON; n = 456); and 2) GenChoice 90 sorted for male calves (SEXED; n = 440). Blood samples were collected at AI and 7 d later to determine concentrations of progesterone and assess cow response to the estrus synchronization protocol. Cows that had progesterone concentrations <1 ng/mL at AI and >1 ng/mL 7 d after AI were considered synchronized. Pregnancy status to AI was determined via transrectal ultrasonography at least 45 d after AI. Data were analyzed with the PROC GLIMMIX of SAS. No treatment effects detected ($P = 0.97$) for synchronization rate (82.8 vs. 82.7% for CON and SEXED cows, respectively; SEM = 1.8). Across both locations, SEXED cows had reduced ($P < 0.01$) pregnancy per AI compared with CON (31.5 vs. 46.3%, respectively; SEM = 2.2). However, within cows inseminated after estrus detection at the Union location, SEXED cows had similar ($P = 0.99$) pregnancy per AI compared with CON (55.8 vs. 55.7%, respectively; SEM = 6.7). Within cows timed-inseminated at the Union location, SEXED cows had reduced ($P = 0.02$) pregnancy per AI compared with CON (35.0 vs. 47.8%, respectively; SEM = 4.0). In summary, cows timed-inseminated with sexed semen had reduced pregnancy per AI compared with cows inseminated with conventional semen, whereas the same outcome was not observed in cows inseminated upon estrus detection.

**Key Words:** AI, beef cow, sexed semen

**W360 Use of a single injection of long-acting recombinant bovine FSH to superovulate Holstein heifers.** P. D. Carvalho*, K. S. Hackbart, R. W. Bender, A. R. Dresch, G. M. Baez, J. N. Guenther, A. H. Souza, and P. M. Fricke, *Department of Dairy Science, University of Wisconsin-Madison, Madison.*

Our objective was to compare the efficacy of a single injection of 2 different preparations of a long-acting recombinant bovine FSH (rbFSH; type A and B) to a porcine pituitary-derived FSH (Folltropin) to superovulate heifers. Nonlactating, non-pregnant Holstein heifers (n = 56) from 12 to 15 mo of age were randomly assigned to 1 of 4 superstimulatory treatments (n = 14/trt). Beginning at a random stage of the estrous cycle, all follicles > 5mm were aspirated, and 36 h later superstimulatory treatments were initiated and a CIDR device was inserted. Treatments were (1) a single injection of 50 μg of A-rbFSH; (2) a single injection of 100 μg of A-rbFSH; (3) 300 mg of pFSH administered in 8 decreasing doses over 4 d; and (4) a single injection of 50 μg of B-rbFSH. All heifers received 25 mg $PGF_{2\alpha}$ at the 5th and 7th FSH injections (in relation to treatment 3). Concurrent with the last FSH injection in treatment 3, CIDRs were removed and ovulation was induced with hCG (2,500 IU) administered 24 h after CIDR removal. Heifers received AI 12 and 24 h after hCG treatment. Number of ovulatory follicles and corpora lutea were evaluated by ultrasound, and embryos were recovered using a nonsurgical flushing procedure 7 d after hCG treatment. Data were analyzed using PROC MIXED of SAS. Superovulatory response and embryo production differed among treatments (see table), but not AMH. In conclusion, a single dose of long-acting rbFSH (either 100 μg of A-rbFSH or 50 μg of B-rbFSH but not 50 μg of A-rbFSH) induced superovulation and produced the same quantity of good-quality embryos compared with pituitary-derived FSH. Supported by CEVA Animal Health.

**Table 1.**

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Follicles (no.) | $5.9 \pm 0.9^{c}$ | $16.6 \pm 3.1^{b}$ | $25.7 \pm 3.2^{a}$ | $18.9 \pm 3.2^{ab}$ |
| CL (no.) | $2.6 \pm 0.9^{b}$ | $15.9 \pm 2.9^{a}$ | $19.1 \pm 2.4^{a}$ | $16.1 \pm 3.0^{a}$ |
| Heifers superovulated (no.) | $4^{b}$ | $12^{a}$ | $14^{a}$ | $13^{a}$ |
| Total ova/embryos recovered (no.) | 4.3 ± 2.4 | 8.4 ± 2.3 | 8.5 ± 2.2 | 10.1 ± 2.4 |
| Fertilized ova (no.) | $2.0 \pm 0.7^{b}$ | $6.4 \pm 2.1^{ab}$ | $8.0 \pm 2.1^{ab}$ | $9.5 \pm 2.3^{a}$ |
| Fertilized ova (%) | $71.6 \pm 16.6^{ab}$ | $63.8 \pm 14.3^{b}$ | $94.5 \pm 2.2^{a}$ | $94.5 \pm 2.0^{a}$ |
| Transferable embryos (no.) | $0.8 \pm 0.5^{b}$ | $4.3 \pm 1.5^{ab}$ | $6.5 \pm 1.7^{a}$ | $7.6 \pm 2.4^{a}$ |
| Transferable embryos (%) | $37.5 \pm 23.9^{b}$ | $44.7 \pm 12.2^{ab}$ | $78.0 \pm 7.3^{a}$ | $66.1 \pm 10.6^{ab}$ |
| Degenerate embryos (no.) | 1.3 ± 0.9 | 2.1 ± 0.8 | 1.5 ± 0.6 | 1.8 ± 0.5 |
| Degenerate of fertilized (%) | 50.0 ± 28.9 | 31.6 ± 8.7 | 18.8 ± 6.7 | 30.5 ± 10.8 |

**Key Words:** superovulation, rbFSH, dairy heifer

**W361 Characterization of follicular fluid adiponectin and its relationship with blood adiponectin during estrous cycle in cattle.** S. P. Singh*[1], S. Häussler[1], D. Tesfaye[2], M. Hölker[2], K. Schellander[2], and H. Sauerwein[1], *[1]Institute of Animal Science, Physiology and Hygiene Group, University of Bonn, Bonn, Germany, [2]Institute of Animal Science, Animal Breeding and Husbandry Group, University of Bonn, Bonn, Germany.*

In humans, adiponectin (Aq) exerts direct effects on folliculogenesis and peri-ovulatory changes in ovarian follicles, while it also known that follicular growth is correlated with Aq gene expression in bovine granulosa and theca cells. The objectives of the present study were to quantify Aq in follicular fluid (FF) and to determine the relationship of Aq levels in FF and serum during estrous cycle (EC) in cattle. Simmental heifers (n = 14; 15–20 mo old) were synchronized by intramuscular (i.m.) administration of 500 mg cloprostenol (PGF2α) twice within 11 d. Two d after each PGF2α treatment, animals received 10 mg GnRH (i.m.). Blood samples and ovaries were collected from animals slaughtered at d 3 (n = 6), 7 (n = 3) or 19 (n = 5) after onset of estrus. FF was collected from the single leading follicle (8–12 mm) from each animal. FF and serum Aq were measured by ELISA (Mielenz et al., 2013). Assay accuracy was confirmed by linearity of serial samples dilutions. Data sets (means ± SEM) were analyzed by mixed model procedure in SPSS. Aq concentrations (µg/mL) in serum and FF, and there ratios were unchanged during EC ($P > 0.05$). Mean FF Aq concentrations (19.4 ± 1.4 µg/mL) were about 60% of mean levels found in serum (31.8 ± 1.5 µg/mL); data and relationships are presented in Table 1. Using the ELISA, Aq could be reliably quantified in FF. The FF:serum Aq ratio was higher than the values reported for women (~0.26 µg/mL). From the results of this study it can be postulated that any effects of Aq on oocyte and/or follicle development in the EC are likely due to changes in regulation of Aq receptor expression or activity.

**Table 1.** Adiponectin (Aq) concentrations (µg/mL) in follicular fluid (FF), serum and their ratio during luteal phase (LP) and follicular phase (FP) of estrous cycle (EC)

| Phase/Days of EC | FF | Serum | FF:serum Aq |
|---|---|---|---|
| LP (d 3) | 20.4 ± 0.4 | 32.7 ± 0.8 | 0.63 ± 0.02 |
| LP (d 7) | 20.0 ± 1.4 | 32.5 ± 1.0 | 0.62 ± 0.05 |
| FP (d 19) | 17.9 ± 2.4 | 30.2 ± 2.8 | 0.63 ± 0.13 |

**Key Words:** follicular fluid, adiponectin, estrous cycle

**W362 Effects of excessive energy intake and supplementation with chromium propionate on serum glucose and insulin concentrations of non-lactating dairy cows.** T. Leiva[1], R. F. Cooke[2], A. Aboin[1], D. B. Araujo[3], and J. L. M. Vasconcelos*[1], *[1]UNESP - Faculdade de Medicina Veterinária e Zootecnia, Botucatu, São Paulo, Brazil, [2]Oregon State University–Eastern Oregon Agricultural Research Center, Burns, OR, USA, [3]Kemin Agrifoods South America, Indaiatuba, São Paulo, Brazil.*

The objective was to determine if excessive energy intake affects serum concentrations of insulin and glucose in nonlactating dairy cows, and if supplementation with Cr propionate modulates this response. Thirteen multiparous, nonlactating Gir × Holstein cows were ranked by BCS, and randomly assigned to 1 of 3 dietary treatments on d 0: 1) diet to meet their ME requirements without Cr supplementation (CON; n = 4), 2) diet to exceed in 70% their ME requirements without Cr supplementation (HIGH; n = 4), and 3) diet to exceed in 70% their ME requirements with 2.5 g of Cr propionate (HICR; n = 5). Diets were offered twice daily via individual self-locking head gates during the experiment (d 0 to 88). Cow BCS was assessed on d 0, 15, 38, and 70. Blood samples were collected before and 2 h after the morning feeding every 4 d. Glucose tolerance tests (GTT) were performed on d 32 and 88. During each GTT, cows were infused (i.v.) with 0.5 g of dextrose/kg of BW. Blood samples were collected at −15, 0, 10, 20, 30, 45, 60, and 90 min relative to infusion, and analyzed for serum glucose and insulin concentrations. Data were analyzed with the PROC MIXED of SAS. A treatment x day interaction was detected ($P = 0.05$) for BCS. During the experiment, BCS increased for HIGH and HICR (0.25 change in BCS for both treatments; SEM = 0.17), and decreased for CON (−0.12 change in BCS, SEM = 0.18). A treatment x day interaction was detected ($P \leq 0.05$) for serum insulin concentrations in samples collected every 4 d and during the GTT. Beginning on d 7, serum insulin concentrations were greater for HIGH vs. CON ($P = 0.09$) and HICR ($P = 0.03$), but similar ($P = 0.39$) between CON and HICR (10.3, 7.3, and 5.7 µIU/mL, respectively; SEM = 1.3). During the GTT, serum insulin concentrations were greater ($P < 0.05$) for HIGH vs. CON and HICR at 10, 20, 60, and 90 min, and greater ($P < 0.05$) for HIGH and CON vs. HICR at 30 and 45 min. In conclusion, Cr propionate supplementation prevented the increase in circulating insulin concentration caused by excessive energy intake in nonlactating dairy cows.

**Key Words:** chromium propionate, dairy cow, energy intake

**W363 Effect of time of insemination relative to ovulation on pregnancy rate of Nelore cows submitted to TAI protocols.** M. M. Filho, J. R. Naves*, R. G. Rezende, T. Santin, T. K. Nishimura, V. B. Nunes, and E. H. Madureira, *São Paulo University, São Paulo, Brazil.*

The economic success in reproduction is related to bovine calf production. The time of insemination relative to ovulation is an important factor in conception rate due to 2 physiological factors, time required for sperm capacitation in the female genital tract and survival of both gametes (spermatozoa and oocyte). The present study aimed to evaluate the influence of time of artificial insemination (AI) on pregnancy rate. The experiment was conducted on the campus of University of São Paulo (USP) Pirassununga, College of Veterinary Medicine and Animal Science (FMVZ). We used 665 Nelore cows submitted to timed artificial insemination protocol. The protocol consisted TAI Day 0 - inserting a device CIDR progesterone (1 mg) intravaginal release in a random stage of the estrous cycle, and an injection of 2.0 mg of estradiol benzoate (EB). On Day 8, the implants of progesterone were removed and the cows received an injection of 0.150 mg of PGF2α and 300 IU of equine chorionic gonadotropin (eCG). On Day 9, they received an injection of 1.0 mg of EB. AI was performed at 10 d with time of ovulation at 7:00 p.m. The cows were randomly divided into 3 experimental groups, according to the time of insemination, being performed using semen of 2 Nelore bulls: Group 1 (G1) inseminated between 1:30 and 2:50 p.m., Group 2 (G2) between 2:51 and 4:10 p.m. and Group 3 (G3) between 4:11 and 5:30 p.m. Pregnancy rate was obtained after 30 d using ultrasound Aloka SSD 500, using linear probe. After ANOVA, G1, G2 and G3 were compared by Teste F and the pregnancy rate obtained in 63.8, 75.4 and 54.7% respectively. The semen of 2 bulls used to AI, was distributed in a balanced form among the groups, however, there was no difference in pregnancy among them. The time of AI influenced ($P < 0.05$) fertility, was observed that the best time to perform the AI is between 6 and 4 h before the expected ovulation.

**Key Words:** Nelore cow, TAI, ovulation

**W364 Enhancing peri-compaction bovine embryo glucose metabolism in vitro in preparation for a hypoxic uterine environment.** V. A. Absalón-Medina*, S. H. Cheong, R. O. Gilbert, and W. R. Butler, *Cornell University, Ithaca, NY.*

The metabolic adjustment from low to high glucose requirements at the onset of the morula stage is a natural event in the oviduct when the embryo is migrating to the uterus. Metabolic regulators (MR) such as 2,4-dinitrophenol (DNP) and phenazine ethosulfate (PES) can improve glucose metabolism of in vitro produced embryos (IVP) via 2 different pathways i.e., glycolysis and pentose phosphate pathways to ensure the metabolic switch. The objective of this study was to evaluate the effects of MR when supplemented to embryos obtained by IVP procedures. A total of 2496 oocytes were used in this project. Statistical analyses utilized ANOVA (JMP) with group as the experimental unit. MR were supplied from d 5 to d 8 post insemination. In experiment 1 (EXP1) embryos were supplemented with PES (0.3 μM), DNP (10 μM), or PES + DNP for comparison to control. In EXP2 embryos were supplemented with lower PES (0.15 μM; based on EXP1 results) in combination with DNP (5, 10 and 30 μM). Two quality control groups were included: control (no MR) and DNP 10 μM + PES 0.3 μM (best treatment from EXP1; control+). In EXP1, control+ resulted in higher embryo development to blastocysts when compared with others (43 ± 3% vs. 33 ± 3%; $P < 0.05$). Mean pixel intensity (MPI) values of embryos stained with Nile Red (indicator of triglyceride content) were reduced in MR compared with control (556 ± 76 vs. 650 ± 75, respectively; $P < 0.05$). PES and DNP alone reduced MPI by 20% relative to control group. There was a positive effect of MR on blastomere counts when compared with control (142 ± 7 vs. 135 ± 7; $P < 0.05$). However, PES alone resulted in embryos with a significantly reduced number of blastomeres (126 ± 7; $P < 0.05$). In EXP2 we observed reduced blastomere counts with any treatment combination different from control groups. In conclusion, addition of MR showed a significant improvement on overall blastocyst rates and reduced MPI values, but most importantly about twice as many embryos reached the expanded stage at d 8 post IVF when MR (control+) were supplied compared all other groups (28 ± 2% vs. 15 ± 2%, respectively; $P < 0.05$).

**Key Words:** bovine embryo, IVF, metabolic regulator

**W365 Conjugated linoleic acid (CLA) does not improve post-thaw performance of expanded-stage in vitro produced bovine embryos.** V. A. Absalón-Medina*, S. H. Cheong, R. O. Gilbert, and W. R. Butler, *Cornell University, Ithaca, NY.*

Conjugated linoleic acid isomers (CLA) can alter the lipid membrane configuration of cells. Our previous work indicated inclusion of CLA (100 μ*M* c9,t11) before vitrification improved post-thaw survival and embryo development. However, CLA was added from morula to early blastocyst stages; i.e., from d 5 to 6.5 post-IVF. For practical purposes we decided to work with later stage embryos suitable for embryo transfers i.e., d 7.5 post-IVF. Our current work on metabolic regulators (MR) indicated a beneficial effect on embryo development and we were interested in additional effects of providing CLA for membrane protection. The objective of this study was to evaluate the effect of CLA *cis*-9 *trans*-11 in combination with MR (2, 4-dinitrophenol [DNP] and phenazine ethosulfate [PES]) on embryos that were subsequently vitrified. MR were supplied from d 5 to d 8 post IVF. CLA was supplied at d 6 for the subsequent 36 h before vitrification. In 3 replicates a total of 620 oocytes were distributed across 4 treatment groups and analyzed by ANOVA (JMP) using group as the experimental unit. Groups were control (BSA), and MR combination (DNP 10 μ*M* + PES 0.3 μ*M*) supplemented without or with BSA-CLA (50 or 100 μ*M cis*-9 *trans*-11) complex. Among all groups, MR-treated embryos resulted in numerically higher re-expansion rates when compared with control after embryos were thawed (71 ± 12% vs. 60 ± 12%). However, CLA treated embryos showed the lowest re-expansion rates and this was more evident with the highest dose (CLA 50 μ*M* = 51 ± 12% vs. CLA 100 μ*M* = 32 ± 12%; $P < 0.05$). Embryos treated with MR and CLA resulted in higher blastomere counts when compared with control (130 ± 5 vs. 114 ± 6; $P < 0.05$). The distribution of cytoskeleton integrity, reflected by F-actin filament staining, remained similar among groups. In conclusion, when providing MR alone, embryos showed good ability to withstand the stressful procedures of vitrification similar to the control group. However, CLA treatment did not result in a further additive effect on blastocyst rates or benefits after vitrification.

**Key Words:** metabolic regulator, CLA, bovine embryo and vitrification

**W366 Excess dietary protein rich in RUP alters ovulatory ovarian follicle growth and circulating steroid hormone concentrations in nonpregnant, nonlactating beef cows.** P. J. Gunn*[1], R. P. Lemenager[2], E. G. Taylor[2], and G. A. Bridges[3], *[1]Department of Animal Science, Iowa State University, Ames, [2]Department of Animal Sciences, Purdue University, West Lafayette, IN, [3]North Central Research and Outreach Center, University of Minnesota, Grand Rapids.*

The objective was to determine if excess dietary CP abundant in RUP would affect follicular dynamics and circulating steroid hormone concentrations. Non-pregnant, nonlactating Angus-cross beef cows (n = 20) were stratified by age, BCS, and BW to 1 of 2 diets designed to meet or exceed NRC (2000) requirements and deliver similar $NE_g$ per d. Diets included corn stover with: supplemental corn silage and corn gluten meal to meet CP requirements (CON) or supplemental corn gluten meal so that daily CP and MP was 150% of CON (PRO). After a 19-d dietary adaptation period, cows were pre-synchronized using the 5 d CO-Synch + CIDR protocol (5D). Ten d after 5D completion, follicular growth was reset with 2.5 mg of estradiol benzoate (EB). Starting at EB and daily thereafter until ovulation, follicular waves were mapped via ultrasonography and blood samples were collected. Corpora lutea (CL) parameters were assessed and diets were concluded 7 d after visual detection of estrus. Data were analyzed using the MIXED procedure of SAS. Treatment did not affect BW or BCS ($P \geq 0.77$). Plasma urea N concentrations were greater ($P < 0.001$) in PRO (9.56 ± 1.34 mg/dL) than CON (4.47 ± 1.34 mg/dL) at EB. Follicular wavelength, follicle size at dominance, and duration of dominance did not differ ($P \geq 0.17$). However, ovulatory follicle diameter the d before ovulation was greater ($P = 0.004$; 15.53 vs. 12.91 ± 0.51 mm) and average daily antral follicle count tended to be greater ($P = 0.06$; 27.9 vs. 23.9 ± 1.31) in PRO than CON, respectively. Peak estradiol concentrations tended ($P = 0.10$) to be greater in PRO (11.7 ± 0.53 pg/mL) than CON (10.3 ± 0.53 pg/mL). Volume of CL did not differ ($P = 0.34$), but progesterone concentrations tended ($P = 0.10$) to be less in PRO (3.29 ± 0.38 ng/mL) than CON (4.25 ± 0.38 ng/mL) 7 d after estrus. In summary, excess CP derived from a RUP-rich feedstuff increased ovulatory follicle diameter and preovulatory estradiol concentrations, but reduced progesterone concentrations in the subsequent estrous cycle of beef cows.

**Key Words:** beef cow, crude protein, ovarian follicle

**W367 Sexual stimulation of male goats with high and low testosterone doses during natural sexual resting periods.** O. Ángel-García[1], C. A. Meza-Herrera[2], J. M. Guillen-Muñoz[1], P. A. Robles-Trillo[1], C. Leyva[1], R. Rodríguez-Martínez[1], F. G. Véliz[1], and G. Arellano-Rodríguez*[1], *[1]Universidad Autónoma Agraria Antonio Narro, Torreón, Coahuila, México, [2]URUZA-Universidad Autónoma Chapingo, Bermejillo, Durango.*

The aim of this study was to evaluate the effect of exogenous testosterone propionate (T) upon sexual behavior in bucks from northern Mexico (26°N) during their natural sexual resting season. Mixed dairy goats bucks received alfalfa hay ad libitum and 200 g animal/day of a commercial concentrate (14% CP). The 3 groups (n = 4 each) were homogeneous regarding body weight and condition score, scrotal circumference and odor score. (1) Group 1 (LD) was treated with 25 mg/d i.m. T per animal, (2) Group 2 (HD) received 50 mg/d i.m. T per animal; both groups received T every third day/3 weeks, and (3) Group 3 (Control) was treated with 1 mL saline every third day/3 weeks. Odor intensity (0–4, 0 = equals female odor, 4 = very active male odor) was registered for each male. Thereafter, male were exposed to 30 anovulatory females for an hour. Differences between the different groups in the frequencies of sexual behaviors were analyzed using a chi-squared test for goodness of fit, with a null hypothesis of equal repartition of behavioral frequencies in 2 groups. The odor was compared by "t" test. T-treated groups displayed more sexual behavior and greater odor intensities ($P < 0.05$) in comparisons to controls (Table 1). Increased testosterone doses (50 mg/d) administrated to bucks during the sexual resting season stimulated sexual behavior. Therefore, such reproductive strategy increases the possibilities to stimulate both sexual and reproductive activity of anestrous female goats during the seasonal anestrous throughout the use of the "male effect" with T-treated bucks.

**Table 1.** Sexual behavior test of male goats treated with low (LD, 25 mg/d/goat) or high (HD, 50 mg/d/goat) dose of testosterone or (Control) and exposed to anovulatory females for an hour for two days in northern Mexico

| Group | Flehmen (no.) | Ano-genital smelling (no.) | Approximations (no.) | Odor (mean ± SEM) | |
|---|---|---|---|---|---|
| | | | | Initial | Final |
| Control | 0 | 23[a] | 0 | 0.3 ± 0.03[a] | 0.3 ± 0.03[a] |
| LD | 32[a] | 41[a] | 21[a] | 0.5 ± 0.2[a] | 1.2 ± 0.22[b] |
| HD | 68[b] | 36[b] | 79[b] | 0.5 ± 0.2[a] | 1.1 ± 0.16[b] |

[a,b]Columns with different superscripts between variables denote statistical differences ($P < 0.05$).

**Key Words:** sexual stimulation, goat, testosterone

**W368 Sexual behavior of bucks treated with testosterone with different male:female ratios is not affected by environmental variables.** O. Ángel-García[1], C. A. Meza-Herrera[2], J. M. Guillen-Muñoz[1], C. Leyva[1], M. Mellado[1], R. Rodríguez-Martínez[1], J. R. Luna-Orozco[3], F. G. Véliz[1], and G. Arellano-Rodríguez*[1], *[1]Universidad Autónoma Agraria Antonio Narro, Torreón, Coahuila, México, [2]URUZA-Universidad Autónoma de Chapingo, Bermejillo, Durango, México, [3]CBTa # 1, Torreón, Coahuila, México.*

The aim of this study was to evaluate the possible relationship of male goat sexual behavior to environmental variables. The study considered different male:female ratios using bucks in reproductive arrest during spring (26°N) and treated with testosterone propionate (25 mg/im, every 3 d during 3 wk); 2 mating loads were evaluated. Multiparous mixed-breed anestrous goats (n = 30) were randomly assigned to 1 of 2 treatment groups with different male:female ratios: (1) G20/1:10 with 20 goats exposed to 2 active bucks, and (2) G10/1:5 with 10 goats exposed to 2 bucks. Response variables considered attempted mounts, complete mounts and mounts with ejaculation, which were registered with a closed-circuit TV system throughout 24 h per day. Hourly differences in number of mount intents, full mounts and mounts with ejaculate were analyzed by Chi-squared test. In addition, correlation analyses were performed to determine the relationship between environmental temperature, relative humidity and THI index regarding buck sexual behavior. No differences ($P > 0.05$) were observed between groups regarding the number of mounts with ejaculation (G1:5 = 40 vs. G1:10 = 62). The effect of environmental variable upon sexual behavior of both groups is shown in Table 1. While intents of mounts were similar (G1:5 = 96; vs. G1:10 = 107; $P < 0.05$), completed mounts was affected by male:female ratio (1:5 = 179 vs. 1:10 = 249; $P < 0.05$). Results indicate that male:female ratios, either 1:5 or 1:10, did not promote any difference between experimental groups except for the number of mounts with ejaculation. In addition, environmental variables do not modified the sexual behavior of testosterone-treated bucks with different male:female ratios during the resting reproductive season at this latitude.

**Table 1.** Observed correlations between sexual behavior of testosterone-treated bucks and environmental variables

| | Temperature | | Relative humidity | | THI | |
|---|---|---|---|---|---|---|
| | Correlation | P-value | Correlation | P-value | Correlation | P-value |
| Mounts completed | 0.116 | 0.588 | 0.068 | 0.752 | 0.152 | 0.961 |
| Mounts with ejaculation | −0.028 | 0.895 | 0.28 | 0.184 | 0.011 | 0.478 |
| Attempted mounts | 0.134 | 0.531 | −0.017 | 0.936 | 0.170 | 0.427 |

**Key Words:** sexual behavior, buck, testosterone

**W369 Effects of progesterone concentration and FSH administration on follicle number and oocyte competence.** S. G. Kruse*[1], B. J. Funnell[1], S. L. Bird[1], H. P. Dias[2], M. L. Day[3], and G. A. Bridges[1], *[1]North Central Research and Outreach Center, University of Minnesota, Grand Rapids, [2]São Paulo State University, Botucatu, São Paulo, Brazil, [3]The Ohio State University, Columbus.*

The objective was to determine the effect of progesterone (P4) concentration and FSH administration on follicle number and oocyte competence, assessed by in vitro blastocyst production (IVP), after collection via ultrasound-guided oocyte pick-up (OPU). Estrus of mature Angus cows was synchronized (estrus = d 0). On d 5.5, follicles were ablated and cows received a used CIDR and 2, 25 mg doses of PG to decrease P4 (L; n = 57) or a new CIDR and no PG to maintain elevated P4 (H; n = 50). On d 7.5, 8, 8.5, and 9 FSH was administered preceding OPU of all visible follicles on d 10.5. After OPU, new or used CIDRs were replaced, cows were not given FSH, and OPU conducted on d 14.5. The experimental design was a 2 × 2 factorial experiment with main effects of P4 (L/H) and FSH (Yes [Y] vs. No [N]). The experiment was conducted in 3 replicates. On d 5.5, 6.5, 8.5, 10.5, 11.5, 12.5, and 14.5, P4 was assessed and follicle number evaluated at OPU. Oocytes were graded (1–6; 1 = ≥5 layers compact cumulus/homogeneous cytoplasm, 6 = denuded) and pooled by treatment for IVP regardless of grade. Cleavage and blastocyst rate, embryo quality, and number of total and dead cells of blastocysts were assessed. Concentration of P4 was decreased ($P < 0.01$) in the L treatment but not affected by FSH. Follicle number was affected ($P < 0.05$) by P4 (H = 19.0 ± 1.4; L = 23.2 ± 1.3) and FSH (Y = 25.1 ± 1.3; n = 16.9 ± 1.3). FSH increased oocytes recovered ($P < 0.01$), and grade 1–3 oocytes ($P < 0.01$) and tended ($P = 0.06$) to increase the percentage of grade 1–3 oocytes. Neither P4 nor FSH treatment affected cleavage or blastocyst rate (H, n = 430, 56.7%, 19.3%; L, n = 544, 61.9%, 22.1%; Y, n = 631, 60.2%, 22.2%; N, n = 343, 58.6%, 18.4%). However, blastocysts from cows in the L treatment were advanced in stage ($P < 0.05$; 5.5 ± 0.2) and tended to have more total cells ($P = 0.08$; 94.7 ± 3.3) than the H treatment (5.1 ± 0.2; 78.6 ± 3.6). In summary, P4 concentrations and FSH administration affected follicle number at OPU and oocytes from cows with low P4 yielded

embryos that were more advanced in stage progression and tended to contain more cells.

**Key Words:** progesterone, oocyte pick-up, FSH

**W370 Gestational form of supplemental selenium affects gene expression in the newborn calf testis. I. Steroidogenesis.** S. R. Garbacik*, J. C. Matthews, K. L. Cerny, and P. J. Bridges, *Department of Animal and Food Sciences, University of Kentucky, Lexington*

A selenium (Se) deficiency in soil necessitates supplementation of cattle feed with this trace element. A requirement of Se for fertility is known, however the effect of Se form consumed during gestation on the steroidogenic capacity of the bull testis remains unknown. Our objective was to determine the effect of inorganic versus organic form of maternal supplemental Se on the expression of genes regulating steroidogenesis in the newborn calf testis. Twenty-four Angus-cross cows, managed under a forage-based cow-calf production regimen, were assigned randomly (n = 8) to individual ad libitum access to a common mineral mix containing 35 ppm of Se supplied as sodium selenite (inorganic, ISe; Prince Se), Sel-Plex (organic, OSe; Sel-Plex, Alltech) or a 50/50 mix of ISe/OSe (Mix) for 4 mo before breeding and through gestation. Thirteen bull calves were born (ISe n = 5; OSe n = 4; Mix n = 4) and castrated within 2 d. Total RNA was extracted from small pieces of whole testis and subjected to microarray analysis using the bovine 1.0 ST arrays (Affymetrix). The effect of cow Se form was evaluated by one-way ANOVA. Overall, 1112 genes were differentially-expressed ($P < 0.05$). Treatment means were separated using a post-hoc pairwise comparison (*t*-test) and 7 mRNA involved in steroidogenesis and steroid hormone receptor binding were identified. When compared with ISe (the standard supplementation regimen) mRNA for: Hsd17b7 was increased in testis from OSe dams and decreased in Mix testis ($P < 0.01$); Hsd17b4 and Akr1c4 was similar in OSe testis and decreased in Mix testis ($P < 0.05$); Sult1e1 was similar in OSe testis and increased in Mix testis ($P < 0.05$); Cyp2s1 did not differ in OSe and Mix testis, however tended ($P = 0.054$) to be higher in Mix than OSe testis; Cyp2c18 was increased in OSe and Mix testis ($P < 0.02$); Cyp2J2 was increased in OSe but not Mix testis ($P < 0.02$). These results demonstrate that maternal source of Se affects development of the steroidogenic gene expression profile in the calf testis. Whether changes beget alteration to adult testosterone production awaits elucidation.

**Key Words:** RNA, selenium, steroidogenesis

**W371 Factors affecting ovulation within three weeks postpartum in dairy cows.** M. M. Vercouteren[3], J. H. Bittar[1], L. I. Barbia[1], M. Gobikrushanth[1], C. A. Risco[1], J. E. Santos[1], A. Vieira-Neto[2], and K. N. Galvão*[1], *[1]University of Florida, Gainesville, [2]Universidade do Estado de Santa Catarina, Lages, SC, Brazil, [3]Utrecht University, Utrecht, the Netherlands.*

Virtually, all dairy cows have their first follicular wave within 2 weeks postpartum; however, only 25–30% ovulate within 3 weeks postpartum. The objective was to evaluate factors affecting ovulation within 21 DIM in dairy cows. Cows (n = 768) from 2 herds had their ovaries scanned by ultrasonography (US) twice a week starting at 17 ± 3 DIM for a total of 4 US. Ovulation was characterized by the presence of a corpus luteum (CL) ≥ 20mm in any US or when a CL < 20mm appeared in 2 consecutive US. The following information was collected: calving season (CS; summer or fall vs. winter or spring), dry period length (DPL; ≤ 70 or > 70d), parity, dystocia, twins, stillbirths, abortions, retained placenta (RP), metabolic problems (ketosis or hypocalcemia), body condition score at enrollment (BCS), and metritis, mastitis, digestive problems [indigestion or displaced abomasum (DA)], lameness, body weight loss (BWL; ≤28 or >28 kg) and daily milk yield in the first 14 DIM. Data were analyzed using the GLIMMIX procedure of SAS. Three models were constructed: 1 – excluding both DPL (not available for primiparous) and BWL (only available for 456 cows); 2 – including DPL; 3 – including BWL. Only variables with $P \leq 0.2$ were included in each model. Herd was included as random. In model 1, cows with metabolic problems (20.7 vs. 33.9%; $P = 0.003$), digestive problems (19.4 vs. 32.2; $P = 0.05$), or that calved in the winter or spring (23.5 vs. 33.1; $P = 0.02$) had decreased ovulation. Dystocia tended to decrease (24.1 vs. 32.9; $P = 0.06$) ovulation. In model 2, cows with metabolic problems (22.0 vs. 38.6; $P = 0.02$) and metritis (17.3 vs. 35.8; $P = 0.05$) had decreased ovulation. Cows with > 70d DPL tended to have decreased (23.9 vs. 36.2; $P = 0.07$) ovulation. In model 3, cows with metritis (21.2 vs. 34.7%; $P = 0.03$), digestive problems (20.0 vs. 33.4%; $P = 0.05$), calved in the winter or spring (24.1 vs. 35.2; $P = 0.01$), or lost >28 kg BW (27.7 vs. 38.5; $P = 0.04$) had decreased ovulation. In conclusion, cows that had metabolic problems, digestive problems, dystocia, metritis, long DPL, calved in the winter or spring or lost >28 kg BW in the first 14 DIM had decreased ovulation within 21 DIM.

**Key Words:** ovulation, first follicular wave, dairy cow

**W372 Physiological and transcriptional adaptations in skeletal muscle of Holstein cows in response to plane of dietary protein during early lactation.** P. Ji*[1], J. J. Loor[2], H. M. Gauthier[1], S. Y. Morrison[1], F. T. da Rosa[3], and H. M. Dann[1], *[1]The William H. Miner Agricultural Research Institute, Chazy, NY, [2]University of Illinois at Urbana-Champaign, Urbana, [3]Federal University of Pelotas, RS, Brazil.*

To study the effect of dietary crude protein (CP) on skeletal muscle metabolism in early lactation, 31 multiparous Holstein cows were randomly assigned at calving to: 1) a high protein diet (H, 17.0% CP) until 21 d in milk (DIM) and a low protein diet (L, 15.3% CP) until 63 DIM (HL, n = 11); 2) H diet until 21 DIM and a moderate protein diet (M, 16.2% CP) until 63 DIM (HM, n = 11); or 3) L diet until 63 DIM (LL, n = 9). Dry matter intake (DMI) and milk yield were recorded daily and milk composition measured weekly starting at wk 2. Plasma 3-methylhistidine (3MH) and serum creatinine (CRE) were analyzed at 1, 7, 13, 19, 26, 40, 54 and 68 DIM. Semitendinosus muscle was biopsied at 2, 11 and 62 DIM for RNA extraction. The mRNA expression of 30 genes was determined through RT-qPCR and normalized using geometric mean of internal control genes (ERC1, MRPL39, and UXT). Data were analyzed as a completely randomized design using MIXED procedure of SAS. Treatments did not affect ($P > 0.05$) DMI (25.7 ± 0.8 kg/d), milk yield (49.9 ± 2.7 kg/d), composition, and the ratio of 3MH/CRE (297.2 ± 21.7 nmol/mg). Intake of CP was 3.79, 3.95, and 4.20 (±0.12) kg/d for LL, HL, and HM ($P = 0.06$). The expression of OXCT1, involved in ketone body (KB) utilization, was increased in LL and decreased in HM from 2 to 62 DIM ($P = 0.01$). A time effect ($P < 0.05$) was found in genes encoding E3 ubiquitin-protein ligases (FBXO32 and TRIM63), enzymes facilitating β-oxidation and sparing glucose (ACADVL, ACOX1, FABP3, CPT1B, and PDK4), translation repressor protein (EIF4EBP1), transcription factor (FOXO1 and PPARD), insulin (INSR) and mTOR pathway (RHEB) with higher expression on 2 over 62 DIM, whereas CAPN3, encoding a calcium-dependent protease, exhibited the opposite expression pattern ($P < 0.05$). Moderate reduction of CP during early lactation did not affect performance, muscle proteolysis and metabolism at mRNA level with the exception of KB utilization, which warrants further research. Initiation of lactation

orchestrated transcriptional adaptation of muscle in favor of utilizing fatty acid, conserving glucose and increasing proteolysis.

**Key Words:** cow, dietary protein, muscle

**W373 Hepatic purinergic signaling gene network expression in dairy cattle during the peripartal period.** J. Seo, J. S. Osorio*, and J. J. Loor, *University of Illinois, Urbana.*

The liver plays a central role in allowing dairy cattle to make a successful transition into lactation. In liver, as in other tissues, extracellular nucleotides and nucleosides trigger cellular responses through adenosine (P1) and ATP (P2) receptors. ATP and certain nucleotides serve as distress signals and are involved in heightened purinergic receptor activation in several pathologic processes. We evaluated the mRNA expression of genes associated with the purinergic signaling network in liver tissue during the peripartal period. Seven multiparous Holstein cows were dried off at d −50 relative to expected parturition and fed a controlled-energy diet (NEL = 1.24 Mcal/kg of DM) at intakes to meet and not greatly exceed 100% of NRC requirements during the entire dry period. All cows were fed a common lactation diet after calving. Liver tissue was harvested at −10, 3, and 21 d for mRNA expression of 9 purinergic receptors, 7 ATP and adenosine receptors, and 10 enzymes associated with ATP hydrolysis. The ANOVA model had day as the fixed effect and cow as the random effect. Differences between days were significant at a $P < 0.05$. The expression of some P2 receptors (P2RX4, P2RX7, P2RY1), ATP release channels (GJB1), and adenosine uptake (SLC29A1) increased ~2-fold between −10 and 3 d and remained elevated at 21 d. In contrast, expression of P1 receptors (ADORA2A and ADORA3) and several nucleoside hydrolases (ENTPD7, ENPP2, ENPP3, ADA) decreased ~2-fold between −10 and 3 d and remained downregulated at 21 d. Results suggested that alterations in hepatic purinergic signaling after calving could be functionally important because of their known role in bile formation, glucose metabolism, cholesterol uptake, steatosis, and inflammation.

**Key Words:** liver, inflammation, transition cow

**W374 Five-day Resynch programs in dairy cows including the CIDR at two stages post-artificial insemination.** S. L. Pulley*, S. L. Hill, and J. S. Stevenson, *Kansas State University, Manhattan.*

Two experiments were conducted to assess pregnancy outcomes after a 5-d Ovsynch-56 Resynch (RES; GnRH injection 5 d before [G-1; d 0] and 56 h (G-2) after $PGF_{2\alpha}$ [PG] injections on d 5 and 6, timed AI [TAI] on d 8) with and without a progesterone-releasing intravaginal controlled internal drug release (CIDR) 5-d insert. In Exp. 1, nonpregnant cows were enrolled on d 34 post-AI: d 34 RES-CON (n = 528) or d 34 RES-CIDR (n = 503). Blood was collected for progesterone (P4) assay. Pregnancy per AI (P/AI) was diagnosed by palpation per rectum at 34 and 69-d post-TAI. Only 76% of 1,031 cows had high P4 (≥1 ng/mL) at d 34 nonpregnant diagnosis (NPD). The d 34 RES-CIDR cows with low (<1 ng/mL) P4 had greater ($P = 0.036$) P/AI than d 34 RES-CON (37.7 vs. 29.4%), whereas d 34 RES-CIDR cows with high P4 had lesser P/AI than d 34 RES-CON (27.4 vs. 34.3%). In Exp. 2, cows were enrolled on d 31 post-AI (NPD): (1) d 31 PG3G (n = 102): Pre-PG on d 31, Pre-GnRH on d 34, and RES on d 41 (n = 102); (2) d 41 RES-CON (n = 108) as Exp. 1 but on d 41; and (3) d 41 RES-CIDR (n = 101) as Exp. 2 but on d 41. Blood was collected for P4 assay and ovarian structures were mapped by ultrasonography on d 31, 34, 41, 46, and 48. Pregnancy was diagnosed by ultrasonography on 31 and 59 d post-TAI. Proportion of cows with high P4 on d 31 was 70.6%. More ($P < 0.001$) cows ovulated after Pre-GnRH of d 31 PG3G (60.4%) than for d 41 RES-CON (12.5%) or d 41 RES-CIDR (17.1%). More ($P < 0.001$) PG3G cows had luteolysis after Pre-PG on d 31 than other treatments (73.7 vs. < 11%). Proportion of cows with high P4 on d 41 at G-1 tended ($P = 0.10$) to be greater for PG3G (75.6%) than for other treatments (65 to 70%). The P/AI was greater in cows starting RES on d 41 when P4 was low (44%) than high (33%), but no treatment differences were detected at 31 d after TAI (PG3G = 33.3%; d 41 RES-CON = 38.9%; d 41 RES-CIDR = 35.6%). We conclude that use of the CIDR insert is progesterone-dependent for cows initiating RES on d 34. Although d 31 PG3G increased luteolysis and greater ovulation rates before RES, no increase in P/AI compared with RES started on d 41 with or without a CIDR insert.

**Key Words:** Resynch, CIDR, pregnancy

**W375 Effect of early or late resynchronization on reproductive performance of dairy cows observed for estrus.** L. D. P. Sinedino*[1], F. S. Lima[1], R. L. A. Cerri[2], and J. E. P. Santos[1], *[1]University of Florida, Gainesville, [2]Unviersity of British Columbia, Vancouver, BC, Canada.*

The objective was to evaluate reproductive performance of dairy cows subjected to early (ER) or late (LR) resynchronization after nonpregnancy diagnosis. Holstein cows (n = 972) had their estrous cycle presynchronized and were then subjected to the Ovsynch protocol (d0 GnRH, d7 PGF, d9 GnRH, d10 AI) for first AI at 68 DIM. Weekly cohorts of cows were blocked by parity and assigned randomly to ER, based on nonpregnancy diagnosis using pregnancy associated glycoprotein (PAG) in blood, or LR based on palpation. ER cows received GnRH 2 d before PAG testing between 27 and 33 d after the previous AI, and not reinseminated nonpregnant cows continued on the Ovsynch for timed AI. LR cows had pregnancy diagnosed between 36 and 49 d after AI and those not reinseminated nonpregnant were resynchronized with the Ovsynch starting on the day of nonpregnancy diagnosis. After first AI, all cows were observed for estrus based on removal of tail chalk and those in estrus were inseminated on the same day. The study lasted 70 d for ER and 112 d for LR to allow a maximum of 2 resynchronized timed AI for each treatment in cows not observed in estrus. Pregnancy was based on palpation 36 to 49 d after AI. Data were analyzed with the GLIMMIX and PHREG procedures of SAS. The sensitivity and specificity PAG diagnoses were calculated. Pregnancy per AI (P/AI) at first AI did not differ between treatments and averaged 28.9%. Cows in ER tended ($P = 0.09$) to become pregnant faster after the first AI than LR cows (AHR = 1.25; 95% CI = 0.96–1.65), resulting in median days open of 133 and 141 for ER and LR, respectively. The proportion of cows not pregnant to first AI resynchronized with timed AI was greater ($P < 0.01$) for ER than LR (29.9 vs. 8.5%). P/AI after the first AI tended ($P = 0.09$) to be greater for cows reinseminated on estrus than resynchronized with timed AI for both ER (18.3 and 14.0%) and LR (15.7 and 10.4%). Sensitivity of PAG to diagnose a pregnant cow on d 27–33 after AI was 95.7% and on d 36–49 was 94.4%. Early diagnosis of nonpregnancy based on PAG with ER increased submission to timed AI, but tended to reduce interval to pregnancy in cows observed for estrus.

**Key Words:** dairy cow, resynchronization, PAG

**W376 Increasing proestrus decreases pregnancy loss in lactating dairy cows submitted to E2/P4 timed artificial insemination programs.** M. H. C. Pereira[1], A. D. P. Rodrigues[1], L. F. S. P. Barbosa[1], M. C. Wiltbank[2], and J. L. M. Vasconcelos*[3], *[1]Aluno do Programa de Pos-Graduacao em Zootecnia da FMVZ/UNESP, Botucatu, Sao Paulo, Brazil, [2]Department of Dairy Science, University of*

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The hypothesis of this study was that increasing proestrus would improve fertility to the timed artificial insemination (TAI). Lactating Holstein cows (759) yielding 30.5 ± 8kg of milk, with a detectable Corpus luteum (CL) at d-11 were randomly assigned to receive either one of the following treatments: (3d) d-10 = controlled internal drug release (CIDR, 1.9g) +2mg of estradiol benzoate (EB), d-3 = $PGF_2\alpha$ (25mg dinoprost tromethamine), d-2 = CIDR removal+1mg of estradiol cipionate (ECP); d0 = TAI; (4d) d-11 = CIDR+EB, d-4 = $PGF_2\alpha$, d-2 CIDR removal+ECP; d0 TAI. Cows were considered to be synchronized when a CL was detected on d7. Binomial variables were analyzed using PROC GLIMMIX and continuous using MIXED, in SAS. The 4d program tended ($P = 0.06$) to have higher progesterone (P4) at d7 in synchronized cows (3.14 ± 0.2 × 3.05 ± 0.2 ng/mL) than the 3d program. Although the pregnancy per artificial insemination (P/AI) at d32 (3d = 45%[175/385] × 4d = 43.9%[166/377]) and at d60 (3d = 38.1%[150/385] × 4d = 40.0%[154/377]) was not different, the 4d program had lower ($P = 0.04$) pregnancy losses (7.6%[12/166]) than the 3d program (14.7%[25/175]). P/AI at 60d was reduced ($P < 0.01$) for cows that ovulated smaller follicle (<11 = 37.2%[22/66]) or a larger follicle (>17 = 29.3%[39/128]), compared with follicles between 11 to 17mm (49.1%[197/395]). The cows in the 4d program were more likely ($P < 0.01$) to be detected in estrus (73.0%[269/374]) compared with 3d program (63.4%[240/385]). Expression of estrus improved ($P < 0.01$) synchronization (97.4%[489/501] × 81%[202/248]). In synchronized cows, the estrus detection improve P4 at d7 (3.22 ± 0.16 × 2.77 ± 0.17ng/mL), P/AI at 32d (51.2%[252/489] × 39.4%[81/202]), P/AI at 60d (46.3%[230/489] × 31.1%[66/202]) and reduce ($P < 0.01$) the pregnancy loss (9.3%[22/252] × 19.8%[15/51]), compared with cows that did not show estrus. In cows not detected on estrus within small (<11) or large follicles (>17) had higher pregnancy loss ($P = 0.01$), but, in cows detected on estrus the follicle diameter did not had effect on pregnancy loss. In conclusion, increasing proestrus increased estrous detection and reduced pregnancy loss.

**Key Words:** proestrus, estrus, pregnancy loss

**W377 Effect of milk ingestion on LH and leptin plasma concentration in preweaning Nellore calves.** G. Nogueira*, M. C. Miguel, H. Costa, J. Souza, R. Cipriano, J. L. Delfino, D. Giraldo, N. Romanello, D. Oliveira, M. A. Maioli, S. P. Gobbo, and D. Pinheiro, *Sao Paulo State University (UNESP), Aracatuba, Sao Paulo, Brazil.*

The aim of this study was to correlate the amount of milk ingested in nursling Nellore calves with live weight, LH and leptin plasmatic concentration from birth until weaning (at 5 mo). Once a month, 16 Nellore heifers were fasted for 12 h, weighed, allowed to suckle for 15 min, and weighed again. Last, a blood sample was collect for LH and leptin quantification after suckling. During the 5-mo period calves ingested on average 3.5kg, but the percent of live weight decreased from the 1st-5th month of age (8.22, 6.67, 3.85, 2.63, 2.63%). From suckling weight (16 × 5 = 80) calves were sorted into high ingestion (HI, ≥ 3.5 kg, n = 34) or low ingestion (LI, ≤ 3.4kg, n = 43) groups. In HI group as live weight increased, suckling weight decreased ($P = 0.043$; $r = -0.35$) and live weight was inversely related to leptin concentration ($P = 0.001$; $r = -0.56$). The increase in leptin concentration was related to greater LH concentration ($P = 0.03$; $r = 0.37$), but neither live weight ($P = 0.1$) nor suckling weight ($P = 0.3$) were correlated to LH concentration. In the LI group there were not similar correlations. When all the calves were considered (both groups combined) there was no correlation between milk ingestion and live weight ($P = 0.17$), but the amount of ingested milk positively increase LH ($P = 0.04$; $r = 0.23$) and leptin concentration ($P = 0.03$; $r = 0.24$). During the 5-mo period live weight was inversely related to LH ($P = 0.05$; $r = -0.22$) and leptin ($P = 0.01$; $r = -0.29$) but leptin was positively correlated to LH ($P = 0.005$; $r = 0.32$). During the calves first 5 mo of age, milk ingestion decreases as live weight increases, and live weight is not related to leptin concentration, probably due to decreased fat mass deposition during this period of time. This observation is coincident with the lack of positive correlation between live weight and LH concentration. But there was correlation between milk ingestion with leptin and LH. Leptin but not live weight was important to increase LH secretion during the preweaning phase in Nellore calves.

**Key Words:** *Bos indicus*, luteinizing hormone, suckling

**W378 Prepartum insulin resistance in dairy cows increases offspring birth weight and insulin concentrations.** L. H. Dauten*, B. E. Sullivan, and H. M. White, *University of Connecticut, Storrs.*

Selection of dairy cattle based on milk production has resulted in cows with increased insulin resistance. Transgenerational selection of heifers born to high-producing cows may exacerbate this trend through in utero effects on the developing fetus. The objective of this study was to determine the effect of maternal insulin resistance on calf birth weight and insulin responsiveness. Ten Holstein cows from the University of Connecticut dairy herd were selected based on anticipated calving date and fed the herd TMR, without nutritional intervention. At 7 d before anticipated calving and 7 d post-calving, BW and BCS were recorded and a 2-h glucose tolerance test was performed using a 0.25 g/kg BW, 50% dextrose bolus delivered via a jugular catheter. Calves were weighed 24h after birth. After 2 colostrum feedings, a meal test was performed, approximately 18 to 24h after birth. A serum sample was collected, one liter of milk fed, and a second serum sample collected at 1h post-feeding. Data (mean ± SE) were analyzed using MIXED procedure of SAS. Cow data were stratified into insulin sensitive and insulin resistant groups, with insulin resistant cows (n = 6) having greater ($P < 0.05$) glucose AUC than insulin sensitive cows (n = 4; 18493 vs. 13410 ± 1140 arbitrary units). There was no effect ($P \geq 0.1$) of parity, body weight, or BCS on maternal insulin resistance. Calves born to insulin resistant dams were heavier ($P < 0.05$) than those born to insulin sensitive dams (51 vs. 40 ± 2 kg). There was no difference ($P \geq 0.1$) in either baseline or 1 h glucose concentrations in calves during meal test; however, the relative change in glucose concentration at 1 h compared with baseline, was greater ($P < 0.05$) in calves born to insulin sensitive dams (153 vs. 117 ± 8%). Insulin concentrations before, but not after, meal test tended to be greater ($P = 0.09$) in calves born to insulin resistant dams (0.17 vs. 0.06 ± 0.04 ng/mL). Increased birth weight and insulin concentration in calves born to insulin resistant cows suggests that maternal insulin resistance, independent of other factors, may alter offspring glucose metabolism.

**Key Words:** insulin resistance, transition, glucose metabolism

**W379 The influence of bPL and IGF-1 on the negative energy balance during the pre-parturition period of dairy cows.** M. M. Weschenfelder[1], P. Montagner[1], A. R. Krause[1], E. Schwegler[1], F. A. B. Del Pino[1], E. G. Xavier[3], F. T. Rosa[1], E. Schmitt[2], A. Schneider[1], C. C. Brauner[1], and M. N. Correa*[1], *[1]Federal University of Pelotas - NUPEEC - Department of Veterinary Clinics, Pelotas, Rio Grande do Sul, Brazil, [2]EMBRAPA, Porto Velho, Rondonia, Brazil, [3]Granja 4 Irmaos, Pelotas, Rio Grande do Sul, Brazil.*

The increase in energy demand that occurs in late pregnancy is due, among other factors, to the histiotrophic distribution of nutrients caused by bovine placental lactogen (bPL), which acts by directing necessary nutrients to the placenta and fetal tissues, thus contributing to the occurrence of pre-parturition negative energy balance (NEB). Cows that have NEB during peripartum also show higher growth hormone (GH) and nonesterified fatty acid (NEFA) concentrations, as well as lower insulin-like growth factor I (IGF-I). Therefore, this study aimed to determine whether bPL is related to NEB occurrence during pregnancy and influences IGF-I concentrations during this period, as well as it acts as an indirect IGF-I concentration regulator. The body condition score (BCS) was assessed weekly, and bPL, IGF-I and NEFA plasma concentrations were assessed between d −21 and calving. Three groups (UP, MED and LOW) were formed according to bPL concentrations (UP >2.51 ng/mL; n = 7; MED >2.3 ng/mL and <2.5 ng/mL, n = 7; LOW <2.29 ng/mL, n = 6). The 5.0 Prism software was used for normalization of data, which were then submitted to MIXED MODELS for the ANOVA; finally, means were compared by the Tukey test through SAS software. Pearson correlation analyses between bPL × IGF-I, bPL × NEFA and NEFA × IGF-I variables were performed. The 3 groups compared differed as to bPL concentrations (UP = 2.91 ± 0.22 ng/mL; MED = 2.32 ± 0.11 ng/mL; LOW = 2.03 ± 0.13 ng/mL; $P = 0.0001$). IGF-I plasma concentrations during the pre-parturition period differed between the groups ($P = 0.0002$), days ($P = 0.0001$) and group-collection interaction ($P < 0.0001$). A correlation between NEFA × bPL variables (r = −0.23; $P = 0.03$) was observed; however, a correlation between bPL and IGF-I variables was not found (r = −0.21; $P = 0.27$). Data referring to NEFA concentrations and BCS assessments did not differ between groups ($P > 0.05$). Therefore, pre-parturition bPL does not act directly on the synthesis and maintenance of IGF-I levels in the blood; nevertheless, it can be one of the mediators of lipolysis during this period.

**Key Words:** NEFA, bPL, IGF-I

**W380 Semen quality of bulls supplemented with protected fat and/or vitamin C and selenium.** M. M. Guardieiro, F. L. M. Silva, P. L. J. Monteiro Jr, A. B. Nascimento, G. M. Chinelato, W. Arruda, N. M. B. Ferreira, L. R. D. Agostinho Neto, G. B. Mourão, and R. Sartori*, *University of São Paulo, Piracicaba, SP, Brazil.*

Bovine sperm membranes are rich in polyunsaturated fatty acids (PUFAs) and are susceptible to lipid peroxidation (LP) following exposure to anaerobic conditions after natural mating. Dietary rumen protected fat rich in PUFAs associated with antioxidant supplementation is an alternative to prevent LP and improve sperm viability. This study evaluated seminal quality of bulls supplemented with rumen-protected fat and/or vitamin C and selenium. Forty-eight Nelore bulls were confined (3 bulls per pen) and assigned to 4 treatment groups according to the addition of rumen-protected fat and/or antioxidant to the diet. For the initial 30 d, all bulls received the same adaptation diet. Thereafter, for 75 d, the same diet was offered, differing in the addition of: F) rumen-protected PUFAs (rich in linoleic, Megalac E, QGN-Arm & Hammer; 1.5% of dm; n = 12); A) antioxidant (a source of vitamin C and selenium, EconomasE, Alltech Biotechnology; 3 g/head/d; n = 12); FA) Megalac E and EconomasE (n = 12), or C) nothing (Control group; n = 12). Semen collection was performed 7 times every 14 d. Data were analyzed as repeated measures by GLM procedure of SAS. The treatment diets did not affect ($P > 0.10$) the semen volume (6.8 ± 0.3mL), gross-motility (3.2 ± 0.1), or proportion of morphologically normal spermatozoa (90.1 ± 1.4%). On the other hand, the progressive motility was greater for bulls fed FA compared with F or A diets (70.6 ± 1.6 vs. 67.0 ± 1.6 vs. 66.9 ± 1.6%, respectively; $P = 0.06$); however, it was similar to Control group (69.2 ± 1.6%). Independent of the collection period, total number of spermatozoa was lower for bulls fed PUFAs (F and FA) compared with those with no fat feeding (3106.6 ± 407.7 vs. 4261.6 ± 499.6; $P = 0.07$). Bull fed fat also had a greater percentage of total sperm defects at the last experimental evaluation (11.9±1.4 vs. 5.0±1.0%; $P < 0.01$). Bulls fed diets with antioxidants (A and FA) had more spermatozoa in the ejaculate as compared with those with no antioxidant (4224.1 ± 496.9 vs. 3134 ± 410.2, respectively; $P = 0.09$). In conclusion, diet containing the association of PUFAs and antioxidants did not improve the quality of bovine semen. Supported by CNPq, FAPESP, QGN, Alltech and EMBRAPA.

**Key Words:** spermatozoa, PUFA, antioxidant

**W381 Reproductive performance of *Bos indicus* heifers with reduced serum progesterone concentration at the onset of a 5-d Co-Synch + CIDR program.** M. V. Biehl*1,2, A. V. Pires[1], M. V. C. Ferraz Junior[2], D. D. Nepomuceno[1], E. M. Ferreira[1], R. S. Gentil[1], L. H. Cruppe[3], and M. L. Day[3], *[1]University of Sao Paulo, Piracicaba, Sao Paulo, Brazil, [2]University of Sao Paulo, Pirassununga, Sao Paulo, Brazil, [3]The Ohio State University, Columbus.*

The objective of this study was to compare reproductive performance of Nellore heifers (n = 162) submitted to the 5d CO-Synch+CIDR (5-d CS) program. The treatments were: $HiP_4$ (n = 62; 5-d CS in heifers with a CL present at CIDR insertion [d −5]); $LoP_4$ (n = 35; 5-d CS in heifers with no CL present at CIDR insertion); PGF-$LoP_4$ (n = 65; 25 mg of PGF2α [PGF] given 2 d before CIDR insertion [d-7] of the 5-d CS in heifers with a CL present on d-8). Ovarian ultrasonography (US) was performed on d-8 and −5, and on d0 to identify the presence of spontaneously formed and GnRH-induced CL, respectively. Blood samples to assess progesterone concentrations were collected on d-5. Heifers presented similar BW (388.4 ± 2.55, kg) and BCS (3.25 ± 0.21, scale of 1 to 5) among treatments. All heifers received 100 µg GnRH (GnRH-1; Cystorelin) at CIDR insertion (d-5). At CIDR removal (d0), heifers received 25 mg of PGF (Lutalyse) and a second 25 mg dose of PGF 24h later. Estrus detection was performed twice daily from d0 to 5 and for rebreeding, from d15 to d24 (AI – AM/PM rule). On d3 all heifers received a second GnRH (GnRH-2) in conjunction with timed AI. Pregnancy diagnosis was performed by US on d32 and 57. Data were analyzed using GLIMMIX procedures of SAS. Ovulation to GnRH-1 was greater ($P < 0.01$) for $LoP_4$ (85.7%) and PGF-$LoP_4$ (95.4%) compared with the $HiP_4$ (25.8%). Estrus detection rate differed ($P < 0.01$) among treatments (14.3; 38.7 and 67.7% for $LoP_4$, $HiP_4$ and PGF-$LoP_4$ treatments, respectively). Timed-AI pregnancy rate tended to be greater ($P = 0.07$) for the PGF-$LoP_4$ (36.9%) than the $LoP_4$ (14.3%) treatment with the $HiP_4$ treatment (29.0%) intermediate and not different from other treatments. Neither rebreeding pregnancy rate ($HiP_4$, 29.0%; $LoP_4$, 31.4% and PGF-$LoP_4$, 18.5%) nor final AI pregnancy rate after the 25d of breeding season ($HiP_4$, 58.1%; $LoP_4$, 45.7% and PGF-$LoP_4$, 55.4%) differed between treatments. In conclusion, reduced serum progesterone concentration at the beginning of a 5d CO-Synch+CIDR program increased the ovulatory response to the first GnRH, but did not improved pregnancy rate to timed-AI.

**Key Words:** heifer, 5-d CO-Synch + CIDR, progesterone

**W382 Estradiol benzoate-based protocol versus GnRH-based protocol for timed AI in dairy cattle.** P. L. J. Monteiro Jr.*[1], R. S. Surjus[1], A. B. Nascimento[1], A. P. Lemes[1], A. B. Prata[1], M. C. Wiltbank[2], and R. Sartori[1], *[1]University of São Paulo, Piracicaba, SP, Brazil, [2]University of Wisconsin-Madison, Madison.*

Objective were to compare ovarian dynamics and fertility of dairy cows subjected to a timed AI protocol initiating with either GnRH or estradiol benzoate (EB) and ending with estradiol cypionate (EC) or EB, in a 2 × 2 factorial arrangement. On Day 0 of the protocol, Holstein cows (n = 418 cows; 35.5 ± 1.1 kg of milk/d [Mean ± SE]; DIM: 165.6 ± 12.7; BCS: 2.8 ± 0.03) were treated with GnRH (10 µg buserelin, i.m., Sincrofort, Ourofino; n = 221) or EB (2 mg, i.m., Sincrodiol, Ourofino; n = 197), both associated with intravaginal progesterone (P4; 1.9 g, CIDR, Pfizer). All cows were treated with 2 doses of cloprostenol sodium (0.526 mg, i.m., Sincrocio, Ourofino) on D7 and D8. The CIDR was withdrawn on D8 and AI was performed on D10. Ovulation was synchronized by treatment with EC (1 mg, i.m., ECP, Pfizer; n = 202) on D8 or EB (1 mg; n = 223) on D9. Blood samples were collected on D0 and D7 for serum P4 concentration using RIA. Ovarian ultrasound evaluations were performed on D0, D7 and D10 and pregnancy diagnosis was done at 28 and 56 d after AI. Statistical analyses were performed with the Glimmix procedure of SAS ($P < 0.05$). There was no difference between EC (D8) and EB (D9) on all evaluated traits as well as no interaction among treatments. When comparing EB to GnRH, circulating P4 on D7 was lower in cows receiving EB on D0 (1.8 ± 0.3 vs. 3.2 ± 0.2 ng/mL). Furthermore, more cows treated with EB on D0 had luteolysis between D0 and D7 (49.5 vs. 25.8%). Ovulation after D0 was 10.7 vs. 29.0% for EB and GnRH, respectively. These outcomes resulted in more cows with CL on D7 in GnRH (71.4%) than EB (43.0%). Cows treated with EB on D0 had a smaller ovulatory follicle on D10 (13.9 ± 0.35 vs. 15.0 ± 0.34 mm). There was no effect of treatment on CR at Day 28 (31.2 vs. 34.9%), or Day 56 (27.0 vs. 32.4%), or pregnancy loss (11.7 vs. 5.6%) for EB vs. GnRH, respectively. Thus, initiation of a timed AI protocol with GnRH rather than EB resulted in increased circulating P4 and number of CL on D7, and increased ovulatory follicle size, but no detectable differences in fertility in lactating dairy cows. Acknowledgment: São Jorge Farm, CAPES, CNPq, FAPESP, and Pfizer.

**Key Words:** TAI, estradiol, progesterone