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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  $30.5 \pm 8$  kg 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<sub>2</sub> $\alpha$  (25mg dinoprost tromethamine), d-2 = CIDR removal+1mg of estradiol cypionate (ECP); d0 = TAI; (4d) d-11 = CIDR+EB, d-4 = PGF<sub>2</sub> $\alpha$ , 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 ( $3.14 \pm 0.2 \times 3.05 \pm 0.2$  ng/mL) than the 3d program. Although the pregnancy per artificial insemination (P/AI) at d32 (3d = 45%[175/385]  $\times$  4d = 43.9%[166/377]) and at d60 (3d = 38.1%[150/385]  $\times$  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]  $\times$  81%[202/248]). In synchronized cows, the estrus detection improve P4 at d7 ( $3.22 \pm 0.16 \times 2.77 \pm 0.17$  ng/mL), P/AI at 32d (51.2%[252/489]  $\times$  39.4%[81/202]), P/AI at 60d (46.3%[230/489]  $\times$  31.1%[66/202]) and reduce ( $P < 0.01$ ) the pregnancy loss (9.3%[22/252]  $\times$  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 nursing 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 ( $16 \times 5 = 80$ ) calves were sorted into high ingestion (HI,  $\geq 3.5$  kg,  $n = 34$ ) or low ingestion (LI,  $\leq 3.4$ kg,  $n = 43$ ) 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  $\pm$  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  $\pm$  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  $\pm$  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  $\pm$  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  $\pm$  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<sup>1</sup>, P. Montagner<sup>1</sup>, A. R. Krause<sup>1</sup>, E. Schwegler<sup>1</sup>, F. A. B. Del Pino<sup>1</sup>, E. G. Xavier<sup>3</sup>, F. T. Rosa<sup>1</sup>, E. Schmitt<sup>2</sup>, A. Schneider<sup>1</sup>, C. C. Brauner<sup>1</sup>, and M. N. Correa<sup>\*1</sup>, <sup>1</sup>Federal University of Pelotas - NUPEEC - Department of Veterinary Clinics, Pelotas, Rio Grande do Sul, Brazil, <sup>2</sup>EMBRAPA, Porto Velho, Rondonia, Brazil, <sup>3</sup>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. Chinellato, 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\*<sup>1,2</sup>, A. V. Pires<sup>1</sup>, M. V. C. Ferraz Junior<sup>2</sup>, D. D. Nepomuceno<sup>1</sup>, E. M. Ferreira<sup>1</sup>, R. S. Gentil<sup>1</sup>, L. H. Cruppe<sup>3</sup>, and M. L. Day<sup>3</sup>, <sup>1</sup>University of São Paulo, Piracicaba, São Paulo, Brazil, <sup>2</sup>University of São Paulo, Pirassununga, São Paulo, Brazil, <sup>3</sup>The Ohio State University, Columbus.

The objective of this study was to compare reproductive performance of Nelore heifers (n = 162) submitted to the 5d CO-Synch+CIDR (5-d CS) program. The treatments were: HiP<sub>4</sub> (n = 62; 5-d CS in heifers with a CL present at CIDR insertion [d -5]); LoP<sub>4</sub> (n = 35; 5-d CS in heifers with no CL present at CIDR insertion); PGF-LoP<sub>4</sub> (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<sub>4</sub> (85.7%) and PGF-LoP<sub>4</sub> (95.4%) compared with the HiP<sub>4</sub> (25.8%). Estrus detection rate differed (*P* < 0.01) among treatments (14.3; 38.7 and 67.7% for LoP<sub>4</sub>, HiP<sub>4</sub> and PGF-LoP<sub>4</sub> treatments, respectively). Timed-AI pregnancy rate tended to be greater (*P* = 0.07) for the PGF-LoP<sub>4</sub> (36.9%) than the LoP<sub>4</sub> (14.3%) treatment with the HiP<sub>4</sub> treatment (29.0%) intermediate and not different from other treatments. Neither rebreeding pregnancy rate (HiP<sub>4</sub>, 29.0%; LoP<sub>4</sub>, 31.4% and PGF-LoP<sub>4</sub>, 18.5%) nor final AI pregnancy rate after the 25d of breeding season (HiP<sub>4</sub>, 58.1%; LoP<sub>4</sub>, 45.7% and PGF-LoP<sub>4</sub>, 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.\*<sup>1</sup>, R. S. Surjus<sup>1</sup>, A. B. Nascimento<sup>1</sup>, A. P. Lemes<sup>1</sup>, A. B. Prata<sup>1</sup>, M. C. Wiltbank<sup>2</sup>, and R. Sartori<sup>1</sup>, <sup>1</sup>University of São Paulo, Piracicaba, SP, Brazil, <sup>2</sup>University of Wisconsin-Madison, Madison.