W102  The association between serum anti-Müllerian hormone (AMH) concentration and fertility, and genomic heritability and genome-wide associations for serum AMH in Irish dairy cows. M. Gobikrushanth1,2, D. Purfiled3, E. Canadas4, M. Herlihy3, J. Kenneally3, M. Murray5, F. Kearney6, M. Colazo3, D. Ambrose5,1, and S. Butter2,1 1University of Alberta, Edmonton, AB, Canada, 2Teagasc, Moorepark, Cork, Ireland, 3Teagasc, Dunsany, Meath, Ireland, 4Irish Cattle Breeding Association, Bandon, Cork, Ireland, 5Alberta Agriculture and Forestry, Edmonton, AB, Canada.

Objectives were to (1) characterize the distribution and variability of serum anti-Müllerian hormone (AMH) concentration, (2) examine the association between serum AMH and reproductive outcomes, (3) estimate genomic heritability for serum AMH, and (4) identify putative single nucleotide polymorphisms associated with phenotypic variation in serum AMH in Irish dairy cows. Serum AMH (pg/mL) was determined from a single blood sample collected between 7 and 13 d after first insemination at detected estrus (IDE) in 2,628 dairy cows managed under pasture-based seasonal-calving system. Overall, serum AMH had a positively skewed distribution with the mean (±SEM), median, minimum and maximum concentrations of 326 ± 4, 268, 15 and 2,863 pg/mL, respectively. Cows were categorized into low (<150 pg/mL; n = 526, lowest 20%), intermediate (≥150 to ≤ 461 pg/mL; n = 1,576, intermediate 60%) and high serum AMH (>461 pg/mL; n = 526, highest 20%) groups and associations with reproductive outcomes were tested. Cows with high and intermediate serum AMH had 1.5 times greater odds of pregnancy within 84-d after mating start date compared with cows with low serum AMH (91 and 90 vs. 86%, respectively); however, pregnancy to first IDE and pregnancy rate within 21 and 42-d after mating start date did not differ between AMH categories. Serum AMH was moderately heritable (genomic heritability estimate of 0.40 ± 0.05), and 68 single nucleotide polymorphisms across Bos taurus autosomes 7 and 11 were associated with phenotypic variation in serum AMH. Serum AMH concentration had high variability and moderate heritability; however, a reduced fertility in the low serum AMH group was only evident at the end of the breeding season.

Key Words: ovarian reserve, reproductive phenotype, antral follicle count

W103  Association between milk yield and fertility by health status during early lactation. P. Pinedo1, J. Santos2, G. Schuermann3, R. Bicalho4, R. Chebel5, K. Galvao2, R. Gilbert6, S. Rodriguez-Zas2, G. Rossa2, C. Seabury2, and W. Thatcher2, 1Colorado State University, Fort Collins CO, 2University of Florida, Gainesville, FL, 3The Ohio State University, Columbus, OH, 4Cornell University, Ithaca, NY, 5University of Illinois, Urbana-Champaign, IL, 6University of Wisconsin, Madison, WI, 7Texas A&M University, College Station, TX, 8Ross University, St. Kitts, West Indies.

Opposite trends for milk yield and fertility traits have been reported. However, the confounding effect of health status adds complexity to these associations. Our objective was to test the association between milk yield during early lactation and fertility variables, considering the effect of health during the first 50 DIM. Holstein cows (n = 11,733) calving in 16 farms in 4 regions (NE, MW, SE, and SW) were enrolled at parturition and monitored weekly for reproductive and health events. Pregnancy was diagnosed by ultrasonography on d32 after AI and monthly DHII milk yields were available. Cows with dystocia, twins, retained fetal membranes, metritis, clinical endometritis, subclinical ketosis, mastitis, displaced abomasum, or pneumonia within 50 DIM were considered as unhealthy (UH50; n = 6,437) and the remaining cows were identified as healthy (HT50; n = 4,302) to control for the effect of disease. Daily average milk until 90 DIM (MLK90) was categorized by quartiles into low, mid, and high. Fertility variables were pregnancy to first AI (PAI1) and pregnant at 305 DIM (P305). Logistic regression and ANOVA were used for the analyses, with parity number and calving season included as fixed effects and farm as a random effect in the models. Logistic regression and ANOVA results for UH50 and HT50 cows are presented in Table 1. Odds of PAI1 did not differ for UH or HT populations between MLK90 levels; in contrast, odds of P305 increased sequentially from low to high MLK90 categories. Similarly, MLK90 was greater in cows pregnant at 305 DIM in both populations.

Key Words: milk, fertility

Table 1 (Abstr. W103). Odds (95%CI) of pregnancy at first AI and at 305 DIM and average MLK90 for different levels of milk yield (90 DIM) and pregnancy status in UH50 and HT50 subpopulations

<table>
<thead>
<tr>
<th>MLK90 (kg)</th>
<th>MLK90 (kg)</th>
<th>MLK90 (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UH50</td>
<td>HT50</td>
</tr>
<tr>
<td></td>
<td>PAI1</td>
<td>P305</td>
</tr>
<tr>
<td>Low (&lt;32.7)</td>
<td>0.91 (0.78–1.06)</td>
<td>0.39 (0.33–0.46)</td>
</tr>
<tr>
<td>Mid (32.7–45.8)</td>
<td>0.97 (0.86–1.08)</td>
<td>0.76 (0.66–0.86)</td>
</tr>
<tr>
<td>High (&gt;45.8)</td>
<td>Referent</td>
<td>Referent</td>
</tr>
</tbody>
</table>

Pregnant: no 38.5 ± 0.16 37.8 ± 0.27 39.6 ± 0.22 36.4 ± 0.23
Pregnant: yes 38.2 ± 0.20 38.5 ± 0.14 39.3 ± 0.28 38.5 ± 0.12

P-value 0.21 0.02 0.36 <0.0001

W104  Use of Zn2⁺ chelators to improve bovine artificial oocyte activation. V. Negron-Perez*, K. Uh, and K. Lee, Virginia Polytechnic Institute and State University, Blacksburg, VA.
Artificial oocyte activation is necessary during somatic cell nuclear transfer (SCNT) and can improve development of intracytoplasmic sperm injection embryos. Recent studies indicate that zinc chelators effectively activate porcine embryos by possibly decreasing the mitotic inhibitors and maturation promoting factor activity. The study objective was to optimize the use of Zn$^{2+}$ chelators to activate bovine oocytes; TPEN [N,N,N,N′-tetakis(2-pyridylmethyl)-1,2-ethanediamine], TPA [tris(2-pyridylmethyl)amine] and PHEN (1, 10-phenanthroline) were tested. All experiments were completed in 7 replicates including: PHEN 20, 400 or 650 µM; TPA 5, 50 or 100 µM; or TPEN 5 or 100 µM; in vitro fertilized (IVF) as a positive control; ionomycin (ion) followed by DMAP (6-dimethylaminopurine) as a positive control; and dimethyl sulfoxide as negative control. Changes in Zn$^{2+}$ intracellular levels post-treatment and blastocyst formation at d 9 post-activation were evaluated. Generalized linear mixed models on SAS were used to identify statistical differences (treatment was fixed). When treated with any of the chelators, the level of intracellular Zn$^{2+}$ was significantly reduced ($P < 0.001$). All chelators were able to induce artificial activation as indicated by cellular divisions; however, frequency of blastocyst formation was lower compared with the positive controls. Blastocyst production rate was $< 10\%$ overall on activated oocytes whereas $22\%$ of the embryos were blastocysts in both positive control groups. When oocytes were exposed to trio-conditions (i.e. ion followed by a chelator+DMAP mix), blastocyst rate ($>25\%$) was comparable to the bovine oocytes.$^\text{a}$

W105 Effects of nerve growth factor-β added to extenders for oocyte activation, Zn$^{2+}$ chelator, bovine

NGF mRNA expression was also found to be positively associated with acrosome integrity, and chromatin stability. Kruskal-Wallis rank sum test and ANOVA were used for the statistical analysis. Post-thaw sperm motility and velocity parameters (VCL) were decreased, while linearity (LIN) was increased in HIGH versus CONT EEJ samples ($P < 0.01$), but no differences were observed in EPI samples ($P = 0.22$). HIGH EEJ samples had a lower amplitude of lateral head displacement (ALH) at 2.5 and 3 h post-thaw ($P < 0.01$). Post-thaw sperm viability, acrosome integrity, and DNA fragmentation index were not affected by NGF treatment in either EEJ or EPI ($P \geq 0.15$). Treatment with NGF did not improve cryotolerance of sperm collected by electroejaculation or epididymal harvest in bulls. Supplementation with high concentrations of NGF decreased post-thaw VCL and ALH and increased LIN, which may suggest a role in preventing premature sperm hyperactivation and capacitation.

Key Words: motility, nerve growth factor-β, spermatozoa

W106 Phenotyping the expression of estrus behavior in dairy cows using novel heat detection technology. F. G. Kumro$^*$, F. M. Smith$^2$, M. J. Yallop$^3$, S. E. Pooce$^4$, L. A. Ciernia$^1$, and M. C. Lucy$^1$,

Key Words: estrus detection, heritability, FlashMate
as well as more sustainable reproductive management, as hormonal interventions can be minimized. The objective was to describe estrus-related changes in rumination, eating, and high-active time in Holstein heifers using an ear-attached movement sensor whose application has been previously described in lactating cows. Starting at 6 mo of age, outdoor group-housed Holstein heifers (n = 22) received an ear-attached movement sensor (CowManager Sensor, Geryerscop, UT, the Netherlands), and were subjected to weekly ovarian ultrasonography until 2 consecutive ovulations were confirmed. Starting 1 wk after the second ovulation, ovaries were scanned every 2 d until 2 subsequent ovulations were confirmed, monitoring ovarian dynamics throughout 1 complete estrous cycle. Data were evaluated keeping days of estrus (defined as day of highest activity preceding ovulation) and ovulation as reference points, and analyzed using the GLIMMIX procedure of SAS. Mean (+SE) daily rumination time was decreased (295.2 ± 9.6 vs. 427.2 ± 12.0 min/d; P < 0.01) while eating time was unexpectedly increased (386.4 ± 14.4 vs. 338.4 ± 14.4 min/d; P = 0.02) on day of estrus compared with the mean activity over the 5 d preceding. As expected, high-active time was increased (487.2 ± 16.8 vs. 247.2 ± 16.8 min/d; P < 0.01) on day of estrus compared with the 5 d prior. Furthermore, high-active time was markedly increased (376.8 ± 33.6 vs 216.0 ± 9.6 min/d; P < 0.01) during the 2 d preceding day of ovulation. In summary, rumination time was decreased on day of estrus relative to the 5 d preceding, while high-active time was increased on day of estrus relative to the 5 d preceding as well as during the 2 d preceding ovulation. Significant changes in rumination, eating and activity were documented in Holstein heifers by an ear-attached movement sensor, which can be a useful tool for reproductive management.

Key Words: activity monitoring, behavior, estrus detection

W108  Ano-genital distance as a possible indicator of embryo yield and viability in superovulated Holstein cows—A preliminary report. I. Rajesh*1, J. E. Carrelle1, M. Gobikrushanth1, and D. J. Ambrose1,2, 1Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB, Canada, 2Livestock Systems Section, Alberta Agriculture and Forestry, Edmonton, AB, Canada.

Ano-genital distance (AGD) is the distance from the center of the anus to the base of the clitoris in dairy cows, and considered an indicator of prenatal androgen exposure. In our previous work (J Dairy Sci 2017; 100:9815–23) first- and second-parity Canadian Holstein cows with long AGD had lower pregnancy outcomes to first and subsequent artificial inseminations compared with those with short AGD. Consequently, we hypothesized that cows with long AGD have reduced embryo yield and viability compared with cows with short AGD. To determine if embryo characteristics (yield and viability) differed among cows of long and short AGD categories, AGD was measured using digital calipers in 10 Holstein cows that had been previously subjected to superovulation and embryo collection. Cows were classified into either short (≤127 mm; n = 5) or long (>127 mm; n = 5) AGD categories based on the optimum (127 mm) AGD threshold that predicted pregnancy outcomes in our previous report. Data were analyzed using FREQ and GENMOD procedure of SAS. The overall number of structures, fertilized ova, and viable embryos recovered were 73, 54, and 49, respectively. The proportion of total structures tended (P = 0.09) to be greater for cows with short AGD than those with long AGD (58 [42/73] vs. 42 [31/73] %). The proportion of fertilized ova (61 [33/54] vs. 39 [21/54] %) and viable embryos (63 [31/49] vs. 37 [18/49] %) were greater (P = 0.05) for cows with short AGD than those with long AGD. However, within short and long AGD categories, the proportion of fertilized ova out of total structures collected did not differ (79 [33/42] vs. 68 [21/31] %). Likewise, the proportion of viable embryos out of total structures (74 [31/42] vs. 58 [18/31] %) and the proportion of viable embryos out of fertilized ova (94 [31/33] vs. 86 [18/21] %) from each of short and long AGD categories did not differ. In summary, preliminary findings indicate that superovulated Holstein cows with short AGD have greater embryo yield and viability than cows with long AGD. These results need to be confirmed with a larger sample size.

Key Words: embryo characteristics, fertilization, fertility.

W109  Effects of fully-acidified, negative DCAD diets with differing concentrations of dietary calcium fed prepartum on the dominant follicle of the first follicular wave after parturition and pregnancy in Holstein cows. K. Ryan1, A. Guadagnin*4, K. Glosson1,2, S. Bascom2, A. Rowson2, and F. Cardoso1, 1University of Illinois, Department of Animal Science, Urbana, IL, 2Phibro Animal Health Corporation, Teaneck, NJ.

Diets fed during the transition period can play an important role in the cow’s follicular dynamics following parturition. We aimed to compare the effects of feeding a fully-acidified, negative DCAD diet prepartum to multiparous Holstein cows (n = 70) at 2 concentrations of dietary calcium (Ca) inclusion versus a non-acidified, positive DCAD diet prepartum on follicular dynamics and pregnancy postpartum. Treatments began at 28d before expected calving and were: CON (n = 23), a positive DCAD diet with low dietary Ca (0.4% DM); LOW (n = 22), a fully-acidified, negative DCAD diet (urine pH = 5.7) with low dietary Ca (0.4% DM); and HIGH (n = 25), a fully-acidified, negative DCAD diet (urine pH = 5.7) with high dietary Ca (2.0% DM). Follicular development was monitored via ultrasound every 2 d starting at 7 DIM until ovulation of the first dominant follicle (DF). Data were analyzed using the MIXED, LIFETEST, and PHREG procedures in SAS. Association between treatments and days to first ovulation and pregnancy per first timed AI (P/AI) were assessed using Kaplan Meier curves and Cox's proportional hazard regression. Contrasts included CONT1 (CON vs the average of LOW and HIGH) and CONT2 (LOW vs HIGH). Cows fed CON (18.95 ± 0.9 d) had increased (P = 0.01) days to first ovulation than cows fed LOW (17.13 ± 0.6 d) and HIGH (16.12 ± 0.4 d). There was no treatment effect on maximum DF diameter (CONT1 = 17.83±1.5 mm, LOW = 18.33±1.5 mm, and HIGH = 17.56±1.5 mm; SEM 0.44; P = 0.44, CONT1 and P = 0.16, CONT2). There was a tendency for a treatment x days relative to ovulation interaction (P = 0.11) indicating that cows fed CON had a slower rate of growth in the 4 d before ovulation of the first DF than cows fed LOW or HIGH. Cows fed CON (4/19 P/AI) tended to had lower P/AI (P = 0.11; 95CI = 1.02 – 16.6) than cows fed HIGH (11/21 P/AI) but not LOW (8/20 P/AI). In conclusion, cows fed HIGH and LOW had improved days to first ovulation than cows fed CON. Cows fed HIGH tended to be more likely to become pregnant than cows fed CON. Overall, cows fed a fully-acidified, negative DCAD diet prepartum had improved reproductive performance postpartum.

Key Words: dietary cation-anion difference (DCAD), follicle, pregnancy

W110  Effects of parity, season and region on fertility of lactating dairy cows submitted to a Double-Ovsynch protocol for first timed-AI. R. Mur-Novales*1, P. M. Fricke2, V. E. Cabrera2, J. O. Giordano3, M. C. Wiltbank2, and J. P. N. Martins4, 1Independent Dairy Data Analyst, Huesca, HU, Spain, 2Department of Dairy Science, University of Wisconsin-Madison, Madison, WI, 3Department of Animal Science, Cornell University, Ithaca, NY, 4School of Veterinary Medicine, University of Wisconsin-Madison, Madison, WI.
Our objective was to determine the effects of parity, US region and season on pregnancy per AI (P/Al) in lactating dairy cows submitted to Double-Ovsynch (DO) for first timed AI (TAI). Records for first TAI events (60 to 97 DIM; n = 19,298) of cows submitted to DO TAI were collected from on-farm computer records from farms in CA (n = 3), NY (n = 2), and WI (n = 5) between May 2016 and April 2017. Average herd size was 2,355 lactating cows (range: 892 to 3,632 cows). The average submission time to DO for first AI in the studied farms was 90.9% (n = 21,210). Overall, P/Al was 44.5% and ranged from 37.5% to 54.2% among farms. Logistic regression was used to test the effect of parity (1, 2, and ≥3), region, season of TAI, and region × season of TAI interaction within parity. Primiparous cows (48.4%) had more P/Al (P < 0.01) than cows in parity 2 (42.5%) and parity ≥3 (40.8%). Cows in CA (40.8%) had a fewer P/Al (P < 0.01) than cows in NY (45.6%), and WI (46.8%). Primiparous cows from CA farms had fewer P/Al when TAI occurred during the summer than other seasons; however, season did not affect P/Al in primiparous cows from NY and WI dairies (Table 1). Regardless of region, parity-2 cows receiving TAI during summer had fewer (P < 0.01) P/Al than cows receiving TAI during winter and spring. Cows of parity ≥3 in CA had fewer P/Al during all TAI seasons than cows of parity ≥3 in NY and WI except during the summer when cows of parity ≥3 in NY and WI had fewer P/Al than in other TAI seasons. In conclusion, cows submitted to first TAI after DO had overall high P/Al across a wide variety of parities, regions and TAI seasons. Moreover, TAI season did not affect P/Al of primiparous cows submitted to DO for first TAI in the Midwest and Northeast US.

Key Words: fertility, heifer, cow

### Table 1 (Abstr. W110). Effects of region and season within parity on P/Al

<table>
<thead>
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<th>State</th>
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<th>Summer</th>
<th>Autumn</th>
</tr>
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<td>40.5b</td>
<td>33.1c</td>
<td>45.6b</td>
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</tr>
<tr>
<td></td>
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<td>52.2a</td>
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</tr>
<tr>
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<tr>
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<td>41.4bc</td>
</tr>
</tbody>
</table>

*a,b* Means within parity with different superscripts differ (P < 0.05).

Key Words: double-Ovsynch, fertility, timed AI

**W111** Association between reproductive efficiency of heifers and their reproductive performance as lactating cows. B. Mion*, M. R. Carvalho, and E. S. Ribeiro, Department of Animal Biosciences, University of Guelph, Guelph, ON, Canada.

Our objective was to investigate whether reproductive efficiency of nulliparous heifers is predictive of their reproductive performance during the first lactation. Pubertal heifers (n = 2,796) were categorized based on their pregnancy success as: 1) highly fertile - pregnant at the first breeding (HF; n = 1,327); 2) moderately fertile - pregnant at the second or third breeding (MF; n = 899); or 3) subfertile - pregnant at fourth or later breeding (SF; n = 529). Pregnancy diagnosis was performed 45d after breeding. Heifers that failed to become pregnant were excluded (n = 41). Heifers diagnosed pregnant were followed up to 305DIM in their first lactation, and all reproductive events were recorded. Data were analyzed using the PROC GLIMMIX of SAS fitting the adequate data distribution. Statistical models included the effects of heifer category, season of birth, and their interaction. Age at first breeding was similar between groups and averaged 397 ± 0.7d. However, as a result of our experimental design, HF became pregnant earlier than MF, which became pregnant earlier than SF (397 vs 435 vs 508d, respectively; P < 0.01). During first lactation, however, heifer category was not associated with the proportion of cows inseminated (HF = 93 vs MF = 92 vs SF = 90%; P = 0.15), time to first insemination (HF = 79 vs MF = 78 vs SF = 78d; P = 0.12), time to pregnancy (HF = 120 vs MF = 118 vs SF = 115d; P < 0.01), pregnancy per breeding (HF = 37 vs MF = 36 vs SF = 39%; P = 0.57), pregnancy loss (HF = 13 vs MF = 19 vs SF = 15%; P = 0.22) and calving per breeding for the first breeding postpartum (HF = 32 vs MF = 29 vs SF = 33%; P = 0.30), and hazard ratio for pregnancy up to 305DIM (HF = 1.0 vs MF = 0.99 [0.90–1.09] vs SF = 0.92 [0.82–1.04]; P = 0.39). The only difference observed was the proportion of cows diagnosed pregnant by 305DIM, which was greater for HF compared with MF and SF (HF = 91 vs. MF = 92 vs. SF = 87%; P = 0.04). In conclusion, the association between reproductive efficiency of dairy heifers and their reproductive efficiency as first lactation cows was weak and not predictive, which supports the idea that factors affecting fertility in dairy cattle are mostly distinct between heifers and cows.

Key Words: estrous expression, fertility, cow


This study evaluated the association between estrous expression and the duration of the current and previous follicular and luteal phases. A total of 169 events from Holstein cows were enrolled. Cows were monitored continuously by an accelerometer. Ovaries were scanned from the day of first alert until pregnancy as follows: day of alert (0 d), 24 h, 48 h, 10, 14, 17, 21, 24, 28, 31, 35, 38 and 42 d post-alert. Blood samples for progesterone (P4) analysis were collected at the same times as described above. Area under the curve (AUC) was calculated for P4 concentration over the total cycle. Duration of the follicular phase (FPh) was considered as the day of luteolysis until next ovulation and luteal phase (LPh) as the time of ovulation until next luteolysis. Luteolysis was considered as 2 consecutive small CLs (<25mm). Estrous expression was classified as high (≥80 index) and low (<80 index) using the median. The LPh was categorized as short (<18 d) or long (>18 d) also using the median. Data were analyzed by the GLIMMIX procedure of SAS with estrus event as experimental unit and cow as a random effect. An average of 4.4 ± 2.1 estrous cycles per cow were recorded. Each unit increase of AUC of P4 was associated with a 0.15-d increase in the LPh (P < 0.01). The duration of the preceding LPh had an impact on subsequent FPh, as an increase of 1 d of the LPh was associated with a 0.30 d increase in the FPh. Cows with high estrous expression had shorter LPh, FPh and overall length of the estrous cycle when compared with cows that had low estrous expression (21.3 ± 1.1 vs. 25.6 ± 1.9d, P = 0.06; 6.5 ± 0.5 vs. 8.4 ± 0.9 d, P = 0.10; and 27.7 ± 1.7 vs. 37.5 ± 3.1 d, P = 0.02, respectively). Higher concentrations of P4 at the time of estrus were associated with a shorter LPh (slope = −0.10; P < 0.01) but not FPh. Shorter LPh before AI had higher pregnancy per AI (P/Al) when compared with cows with a longer LPh (50.5 ± 7.0 vs. 27.9 ± 8.0%, respectively; P = 0.03). Additionally, for every day increase in FPh duration there was a tendency for 2.5% increase in P/Al (P = 0.10). In conclusion, the duration of the luteal phase is affected by P4 during the FP duration cycle and at the time of estrus, as well as by the intensity of estrous expression detected by an automated activity monitor.

Key Words: estrous expression, fertility, estrous cycle
**W113** Transcriptome of corpus luteum in pregnant and nonpregnant cows at late diestrus. J. F. W. Spricigo*, A. Leclerc1, I. Toledo2, W. W. Thatcher2, and E. S. Ribeiro1. 1Department of Animal Biosciences, University of Guelph, Guelph, ON, Canada, 2Department of Animal Sciences, University of Florida, Gainesville, FL.

Our objectives were to quantify and characterize potential differences in transcriptome of the corpus luteum (CL) in pregnant (P) and nonpregnant (NP) cows at late diestrus. The estrous cycle of primiparous cows (n = 35) were synchronized using the Presynch-CIDR-Synch protocol. On the day of the last GnRH (d 0), 22 cows were selected randomly to be inseminated (AI), while the other cows remained as a nonbred NP group (n = 13). On d 17, all cows were slaughtered and those with an elongating conceptus were classified as P (n = 14). The CL was dissected, weighed, and stored at −80°C. A subsample of CL from P (PCL = 8) and NP (NPCL = 4) were subjected to transcriptome analysis using Affymetrix Gene Chip Array. Data were analyzed using Bioconductor software in R. The GCRMA function was used to preprocess the data, and the Limma package was used to fit a linear model and adjust variances by empirical Bayes adjustment. Moderate t-test was performed and P values were adjusted for multiple testing using the BH false discovery rate. Adjusted P < 0.05 and fold change > 1.5 characterized significant differences. A total of 106 transcripts were differently expressed, 67 upregulated and 39 downregulated in PCL compared with NPCL. Differently expressed genes (DEG) were associated with lipid metabolism, small molecule biochemistry, cell-to-cell signaling and interaction, and cell morphology. Among DEG with increased expression in PCL were APLNR (2-fold), HPGD (2-fold), and AKR1C4 (1.8-fold). The first is relevant for angiogenesis, and the latter 2 are related to metabolism and degradation of prostaglandins. Among DEG with reduced expression in PCL were BOLA (4.3-fold), SERPIN1A14 (1.8-fold), and FAS (1.6-fold). The first is important for antigen presentation and might indicate the abundance of immune cells in the CL, and the latter 2 are important cell survival and tissue remodeling. In conclusion, transcriptome of CL in P and NP cows at late diestrus have important differences that seem to be unrelated to luteolytic signals in NPCL and suggest the presence of endocrine signals derived from the pregnant uterus in the PCL during maternal recognition of pregnancy.

Key Words: corpus luteum, pregnancy, transcriptome

**W115** The reproductive and economic impact among 6 reproductive programs for lactating dairy cows including a sensitivity analysis of the cost of hormonal treatments. A. Ricci*, M. Li2, P. M. Fricke2, and V. E. Cabrera1. 1Department of Veterinary Science, University of Torino, Grugliasco, Torino, Italy, 2Department of Dairy Science, University of Wisconsin-Madison, Madison, WI.

Hormonal synchronization protocols can dramatically increase the reproductive efficiency of high-producing dairy cows, yet some farmers continue to question the economics of these programs based on the cost of hormonal treatments. An economic simulation model considering hormonal treatments and labor was used to compare 6 protocols for timed AI (TAI) in a year-around calving system: PreSynch-OvSynch with estrous detection (ED) before and after first TAI [Conception Rate (CR) 35%; for ED, Service rate (SR) 60% and CR 30%;], Presynch-Ovsynch with different CR (35%, 40%, or 45%); and Double-OvSynch+PGF, (CR = 50%) with the following aims: 1) assess the economic impact of using more intensive synchronization programs and 2) quantify the effect of increasing the cost of GnRH and PGF2α on the profitability of more intensive reproductive programs for high-producing dairy cows housed in confinement systems and managed for year-around calving in the US market ($2.60/GnRH dose and $2.30/PGF2α dose) and in the EU market ($6.70/GnRH dose and $5.10/PGF2α). We confirmed that PreSynch-OvSynch protocols require fewer hormonal treatments than the Double-OvSynch+PGF protocol (1.4 to 3.0 per cow per yr); however, the Double-OvSynch+PGF protocol yielded more profit/cow per yr than PreSynch-OvSynch protocols with ED or 100% TAI after Presynch-Ovsynch protocols ($21.2 to $46.2 in the US market and $5.4 to $36.1 in the EU market). Including ED after first TAI was more profitable than including ED before first TAI or not including ED at all. The sensitivity analyses indicated that hormone costs would need to be 5 to 14 times higher in the US market and 2 to 6 times higher in the EU market for the Presynch-Ovsynch protocols to exceed the profitability of a Double-OvSynch+PGF protocol. Switching from Presynch-Ovsynch to Double-OvSynch+PGF requires a similar number of PGF2α treatments but more GnRH treatments. Our economic analysis consistently found that reproductive programs using more hormonal treatments but yielding greater reproductive performance are more profitable for high-producing dairy cows housed in confinement systems and managed for year-around calving.

Key Words: reproduction, synchronization, economics