Moreover, time related changes in PCC were affected by experimental treatments as well ($P < 0.001$). Overall linear regression analysis showed a significant relation ($P < 0.0001$) between citrulline plasma levels measured on day 4 and villus/crypt ratio and villus height ($\alpha = 0.027$ μmol/L, SE = 0.003 and $\alpha = 3.679$ μmol/L, SE = 0.410 respectively). This study suggests that PCC can be used as a longitudinal marker for small intestinal morphology in weaned piglets. As such, PCC could be a useful parameter in monitoring the effects of different feeding strategies on small intestinal morphology in weaned piglets.

Key Words: citrulline, Intestinal marker, Intestinal morphology

Physiology and Endocrinology: Estrous Synchronization

T209 Effect of progesterone insert during presynchronization program on reproductive responses of dairy cows. R .G. S. Bruno*[1], A. C. Denicol[1], D. F. Resende[1], G. Lopes Jr.[1], L. G. D. Mendonça[1], F. A. Rivera[1], J. E. P. Santos[2], and R.C. Chebel[1], [1]*University of California - Davis*, *Tulare*, [2]*University of Florida*, *Gainesville*.

Lactating Holstein cows from two commercial dairies, 552 (392 multiparous and 160 primiparous) were blocked by parity and body condition at 44±3 d in milk (DIM) and randomly assigned to one of two presynchronization programs, a control (CON, n=282) or a controlled internal drug-releasing (CIDR, n=272) containing 1.38 g of progesterone were inserted at 44±3 DIM and removed on day 51±3 DIM, 11 d before the initiation of the timed AI protocol (GnRH, 7 d PGF2a, and 3 d GnRH + timed AI). All cows were time inseminated at 72±3 DIM. Ovaries were scanned at 62±3 and 69±3 DIM in order to identify ovarian structures and blood was sampled at 62±3, 72±3, and 80±3 DIM for progesterone analyses. Pregnancy was diagnosed at 38 and 66 d after timed AI by palpation per rectum. Data were analyzes by the LOGISTIC procedure of SAS. Pregnancy per AI (P/AI) at 38 and 66 d after insemination was not affected (P=0.45) by type of presynchronization program (35.9 vs 34.6% for CIDR and CON respectively). However cows in the CIDR group had increased (P=0.04) ovulation synchronization following the timed AI program than CON cows (84.8 vs 77.6%, respectively) and synchronized cows had greater (P<0.001) P/AI at 38 and 66 d after AI (40.3 vs. 13.2% at 38 d; 38.2 vs. 12.1% at 66 d). Presynchronization with CIDR did not affect (P=0.72) the number of CL at the time of the initiation of the timed AI protocol, but increased (P=0.05) the proportion of cows with multiple CL at the time of the PGF (62.7 vs. 55.5% for CIDR and CON respectively) and increased (P<0.01) ovulation to the first GnRH of the timed AI (79.7 vs 68.9% for CIDR and CON respectively). Presynchronization with CIDR increased the proportion of cows responding to the synchronization program but did not improve P/AI.

Key Words: dairy cows, presynchronization, progesterone

T210 Effect of duration of CIDR treatment on reproductive performance of dairy heifers using a timed-AI protocol. G. Lopes Jr.*[1], L. G. D. Mendonça[1], R. C. Chebel[1], J. C. Dalton[2], and A. Ahmadzadeh[3], [1]*Veterinary Medicine Cooperative Extension, University of California-Davis*, *Tulare*, [2]*Caldwell Research and Extension Center, University of Idaho*, *Caldwell*, [3]*University of Idaho*, *Moscow*.

The objective of this experiment was to determine the effect of reducing the duration of CIDR insert exposure in a timed-AI (TAI) protocol (CIDR-$PGF_{2\alpha}$-GnRH and AI)on pregnancy per AI (P/AI) in dairy heifers. Holstein heifers (n=415) were assigned randomly to one of three treatments: 1) Control heifers (CONT, n=141) received two $PGF_{2\alpha}$ (25mg) injections every 11 d until inseminated on detected estrus or 22 d after enrollment; 2) CIDR7 heifers (n=135) received a CIDR insert for 7 d; and 3) CIDR5 heifers (n=139) received a CIDR insert for 5 d. Heifers in CIDR7 and CIDR5 were given (i.m.) $PGF_{2\alpha}$upon CIDR removal followed by GnRH (i.m., 100μg) and concomitant with AI approximately 50 h after CIDR removal. All heifers were re-inseminated following 1st AI if detected in estrus. Pregnancy status was diagnosed 36±1 d after AI. Data were analyzed by logistic regression, ANOVA, and Cox proportional hazard regression. Interval from enrollment to 1st AI tended to (P=0.07) and was (P=0.02) shorter for CIDR5 (7.0±0.6) than CONT (8.6±0.6) and CIDR7 (9.0±0.6), respectively, but there was no difference between CONT and CIDR7. Treatment affected ($P < 0.01$) P/AI as CONT (60%) had greater (P<0.05) P/AI compared with CIDR5 (45.3%) and CIDR7 (28.1%). Moreover, CIDR5 had greater (P<0.05) P/AI than CIDR7. Heifers in CONT become pregnant faster (P<0.01) than CIDR5 and CIDR7, and CIDR5 tended to (P=0.06) become pregnant faster than CIDR7. Interval from enrollment to pregnancy was (P<0.01) shortest for CONT (CONT=29.5 ±2.9, CIDR5=43.4±4.3, and CIDR7=49.3 ±3.9 d). Proportion of heifers pregnant at the end of 180 d after enrollment tended to (P=0.11) and was (P<0.01) greater for CONT (97.2%) than CIDR5 (92.8%) and CIDR7 (88.2%). Reducing the duration of CIDR treatment from 7 to 5 d in a CIDR-based TAI protocol increased P/AI; however, heifers inseminated on detected estrus following $PGF_{2\alpha}$ synchronization had greater P/AI compared with either the CIDR5 or CIDR7 TAI protocols.

Key Words: synchronization, CIDR, dairy heifers

T211 Effect of reusing CIDRs on the pregnancy rate of beef cattle. W. A. Greene* and M. L. Borger, *The Ohio State University*, *Wooster*.

The objective of this study was to determine the effect of reusing intravaginal progesterone inserts (CIDRs), as a part of a synchronization program, on pregnancy rates (PR) in beef cattle. One hundred and twenty-four animals were allotted to two similar groups, new CIDR (N) and used CIDR (U), based upon breed, age, postpartum interval, and postpartum cyclicity (as determined by estrus detection and ultrasonography). On d 0, all cattle received 100 μg GnRH i.m., N group cattle received a new CIDR, containing 1.38 g progesterone, and U group cattle received a CIDR previously used for 7d. Used CIDRs had been thoroughly rinsed with a mild disinfectant solution, air-dried, and stored in a dry, enclosed container after first use. Blood samples were collected for plasma progesterone (P4) analyses on d 2. On d 7, CIDRs were removed and animals received 25 mg $PGF_{2\alpha}$ i.m. Each CIDR was evaluated for signs of vaginal infection and scored from 1 (clear) to 5 (heavy pus). Animals were observed for estrus 0700 and 1900 and were artificially inseminated (AI) 11 - 13 h after estrus was observed. If estrus was not observed, animals were timed AI and received 100 μg GnRH i.m. 70 - 72 h after $PGF_{2\alpha}$. Following the synchronization period, repeat breedings were done until d 75. Cattle were pregnancy diagnosed by ultrasonography on d 111. N and U groups had similar ($P > 0.05$) estrus detection rates [EDR] (57.8 and 53.3%). The N group had higher ($P < 0.05$) PR to synchronization (50.0 vs. 28.3%) and higher ($P = .09$) overall PR (93.8 vs. 83.3%) than the U group. The rates of high vaginal

scores (4 & 5) were similar (P > 0.05) for the N and U groups (78.1 and 71.7%). EDR were higher (P < 0.05) for cycling (n=79) animals (63.3%) than anestrus animals (42.2%) while PR to synchronization (41.8 vs. 35.6%) and overall PR (86.1 vs. 93.3%) were similar (P > 0.05) for these two groups. Mean P4 levels (ng/ml) were similar (P > 0.05) for N (1.4 ± 1.5) and U (1.2 ± 1.3) cattle. Reusing CIDRs in a beef cattle synchronization program resulted in lower pregnancy rates than the use of new CIDRs.

Key Words: synchronization, CIDR reuse, progesterone

T212 Reproductive outcomes of beef heifers treated with various duration of CIDR exposure in a modified timed-AI protocol. A. Ahmadzadeh*[1], D. Falk[1], D. Gunn[2], J. B. Hall[3], and B. Glaze[4], [1]*University of Idaho*, *Moscow*, [2]*University of Idaho, R & E Center*, *Fort Hall*, [3]*University of Idaho, R & E Center*, *Salmon*, [4]*University of Idaho, R & E Center*, *Twin Falls*.

The objective of this experiment was to determine the effect of reducing the duration of exposure to an intravaginal progesterone insert (CIDR), in a modified CIDR-synch timed-AI protocol (CIDR-$PGF_{2\alpha}$-GnRH and AI), on pregnancy per AI (P/AI,) and pregnancy rates in beef heifers. The experiment was conducted in three consecutive years. British cross-bred heifers (yr 1, n=88; yr 2, n=70; yr 3, n=86) were stratified by (BW and age; and were assigned randomly to one of two treatments: 1) CIDR7 heifers (n = 120) received CIDR for 7 days, $PGF_{2\alpha}$ (i.m., 25 mg) at CIDR removal, GnRH (i.m., 75 ug) 56 h after CIDR removal and immediate AI and 2) CIDR5 heifers (n=118) received CIDR (d -5) for 5 days, $PGF_{2\alpha}$ (25 mg) at CIDR removal (d 0), GnRH (75 μg) 56 h after CIDR removal and immediate AI. Estrual behavior was monitored for three days following CIDR removal. Heifers were inseminated by a single technician and were exposed to bulls 14 days after AI. Blood samples were collected on the day of CIDR insertion and day of AI. Pregnancy status was determined by ultrasonography at d 32 to 35 and d 67 to 82 after AI. Data were analyzed by logistic regression. Percentage of heifers detected in estrus was different (P<0.05) between years (69%, 44%, 51% for yr 1, 2, and 3, respectively) but not different between treatments. Based on progesterone (P_4) results, the synchronization rates were similar between treatments and across the years. There was a treatment by year interaction effect on P/AI (P<0.05). For CIDR7 and CIDR5, in yr 1 P/AI was 39% and 65.8% (P<0.05); in yr 2, P/AI was 64.7% and 41% (P<0.05), and yr 3 P/AI was 59% and 73.8% (P=0.09). At experiment initiation, greater proportions (P<0.05) of CIDR7 heifers had serum P_4 greater than 1 ng/mL compared with CIDR5 (60% vs 43%). Final pregnancy rates were unaffected by the treatment protocols or year (92% and 95.5% for CIDR7 and CIDR5, respectively). The yearly P/AI results from this study are inconsistent regarding the effect of reducing the duration of CIDR treatment (5-d vs. 7-d) and thus further research is warranted.

Key Words: synchronization, CIDR, beef heifers

T213 Increasing circulating P4 in lactating dairy cattle by treatment with hCG and/or CIDR. A. B. Nascimento*, A. H. Souza, J. N. Guenther, F. P. Dalla Costa, and M. C. Wiltbank, *University of Wisconsin*, *Madison*.

Adequate circulating P4 after AI is important for pregnancy success. Lactating dairy cattle have lower P4 and this problem may be compounded by ovulation of smaller follicles using timed AI protocols, such as Double-Ovsynch (~14mm ovulatory follicle). Our objective was to determine the supplementation strategy, after Double-Ovsynch, which resulted in P4 that approached the concentrations in heifers. Lactating Holstein cows (n=41) were synchronized with Double-Ovsynch (Ovsynch-7d-Ovsynch-timed AI). After AI (Day 5) cows were assigned randomly to receive no treatment (control), 1 CIDR, 2 CIDRs (1st Day 5, 2nd Day 8), 3,300 IU hCG, hCG+CIDR, or hCG+2 CIDRs. A group of heifers after normal estrus were followed as controls (heifers; n=10). Ultrasound and blood samples were used to determine luteal size and circulating P4. Circulating P4 profiles for each treatment were compared to heifers using repeated measures (Proc Mixed, SAS; Treat effect=T; TreatXtime interaction=TXt). Heifers had greater P4 than cows at all times after Day 5 (T and TXt P<.0001). Cows receiving 1 CIDR still had lower P4 than heifers (T P=.0037; TXt NS) with lower P4 at all times from Day 8 to 16. Supplementation with 2 CIDRs produced similar P4 to heifers on all days (T and TXt NS). All cows ovulated after hCG treatment. Treatment of cows with hCG produced P4 similar to heifers (T P=.59); although, there was an interaction (TXt P=.01) with some times tending to be lower in cows treated with hCG. Supplementation with a CIDR+hCG produced a profile similar to heifers (T, TXt NS). Treatment with 2 CIDRs+hCG produced P4 that tended to be greater than heifers (T P=.06; TXt P=.007) with higher P4 from Days 9 to 16. After Day 17, non-pregnant heifers (n=6) and cows (n=13) had CL regression with fewer hCG-treated cows showing luteolysis by Day 19 (P<0.05). Thus, use of CIDRs and production of an accessory CL with hCG can elevate P4 to concentrations found in heifers. This information will be useful for designing future trials that supplement P4 after AI to improve fertility in lactating cows.

Key Words: hCG, CIDR

T214 Effect of increasing GnRH and $PGF_{2\alpha}$ dose during double–Ovsynch on fertility of lactating dairy cows at first postpartum timed artificial insemination. J. O. Giordano*[1], P. M. Fricke[1], S. Bas[1], A. P. Cunha[1], R. A. Pawlisch[2], J. N. Guenther[1], and M. C. Wiltbank[1], [1]*Department of Dairy Science, University of Wisconsin*, *Madison*, [2]*Brodhead Veterinary Clinic*, *Brodhead, WI*.

Our objective was to determine the effect on pregnancies per AI (P/AI) of increasing the dose of the 1st GnRH and $PGF_{2\alpha}$ injections during the Breeding–Ovsynch of Double–Ovsynch (DO; Pre–Ovsynch, GnRH–7d–$PGF_{2\alpha}$–3d–GnRH; 7d later Breeding–Ovsynch, GnRH–7d–$PGF_{2\alpha}$–56h–GnRH–16h–TAI) for 1st post–partum TAI. In Exp.1, cows were blocked by parity and randomly assigned to a 2x2 factorial design to receive either low (L) or high (H) dose of GnRH (100 vs. 200 μg) and either L or high H dose of cloprostenol (500 vs. 750 μg) resulting in the following treatments: LL (*n*=263), HL (*n*=277), LH (*n*=270), and HH (*n*=274). Ovarian ultrasound and serum progesterone (P4) were used to assess ovulation to 1st GnRH and luteal regression after $PGF_{2\alpha}$ (P4 ≤0.5 ng/ml at 2nd GnRH) of Breeding-Ovsynch in a subgroup of cows. Pregnancy status was assessed 29 and 74 d after TAI. In Exp. 2, cows were blocked by parity and randomly assigned to LL (*n*=222) or HH (*n*=226) treatments described for Exp. 1. For Exp.1, P/AI was 47.0% (509/1084) at 29 d and 39.7% (430/1084) at 74 d after TAI, did not differ (*P*=0.31) among treatments at 74 d (LL, 34.6%; HL, 40.8%; LH, 42.2%; HH, 40.9%), and was greater (*P*<0.0001) for primiparous than multiparous cows (46.1 vs. 33.8%). Pregnancy loss from 29 to 74 d did not differ (*P*=0.47) among treatments [LL, 20.0%; HL, 14.6%; LH, 14.4%; HH, 14.8%] and was not affected (*P*=0.37) by parity. Ovulation to the 1st GnRH injection of Breeding–Ovsynch was greater (*P*=0.03) for cows receiving H vs. L GnRH [66.8% (241/361) vs. 58.9% (211/358)];

however, luteal regression after $PGF_{2\alpha}$ did not differ for cows receiving H vs. L dose of $PGF_{2\alpha}$ (93.8% vs. 91.5%). For Exp. 2, P/AI at 29 d did not differ (*P*=0.49) between H vs. L treatments [44.3% (100/226) vs. 41.0% (91/222)], and was not affected by parity (*P*=0.48). Thus, despite an increase in ovulation to the 1st GnRH injection of Breeding–Ovsynch, there was no detectable effect of increasing the dose of GnRH or $PGF_{2\alpha}$ on fertility to 1st post–partum TAI after Double–Ovsynch. *Supported by Hatch project WIS01171*

Key Words: Double–Ovsynch, fertility

T215 Use of eCG, hCG, or estradiol cypionate (ECP) after CIDR removal in Creole Rodeo multiparous cows. J. A. Ramirez-Godinez*, L. V. Beltran-Prieto, E. Santellano-Estrada, and A. Flores-Mariñelareña, *Universidad Autonoma de Chihuahua*, *Chihuahua, Chihuahua, Mexico*.

The aim of the present study was to compare the estrus response (ER), conception rate (CR), and serum progesterone concentrations (P_4) in Creole (C) Rodeo cows treated with ECP, eCG or hCG, in addition to a CIDR + Estradiol Benzoate (EB) and $PGF_{2\infty}$ protocol of estrus synchronization. Thirty-one multiparous C cows received a CIDR with 1.9 g of P_4, and an IM injection of 1 mg of EB. On day 7, the CIDR was removed and 30 mg of $PGF_{2\infty}$ were administered IM and the cows were randomly assigned to one of three treatments: T1 (n=11) received 1mg ECP IM and T2 (n=10) 500 IU eCG IM 24h after CIDR removal, and T3 (n=10) 2000 IU hCG IM 56h after CIDR removal. Estrual behavior was monitored for three days following CIDR removal. Cows in T1 and T2 were AI 12 to 18 h after detected in estrus, and in T3 were fixed-time AI 56h after CIDR removal. Blood samples were collected at CIDR insertion, removal and 24 h after, at breeding, on days 8 (day 0 = AI) and 17 to estrus (repeats), and to day 23 (non repeats). Estrous and conception rates were analyzed with a Fisher exact test using PROC FREQ of SAS. A mixed model with treatment (T), day (D) and their interaction (T*D) as fixed effects and cow within treatment as random effect was adjusted for P_4 using PROC MIXED of SAS. All cows treated with ECP were detected in estrus compared to 80% receiving eCG and 30% hCG ($P < 0.01$), suggesting that the use of ECP promoted the ER. Conception rate was similar between treatments ($P = 0.2421$); however, the numeric difference favored T2 (60%) over T1 (27.27%) and T3 (30%), suggesting that the use of the eCG might have promoted follicular development and ovulation as it has been reported in beef cattle. Serum P_4 did not differ between treatments ($P = 0.4396$) and there was not T*D interaction ($P = 0.9474$). These results suggest that the use of eCG after CIDR removal might improve the conception rate in Creole Rodeo cows.

Key Words: Creole Rodeo cows, eCG, hCG

T216 Effect of body condition score on estrus expression, and AI and breeding season pregnancy rates in beef cows synchronized with progesterone supplemented protocols. R. Kasimanickam* and W. D. Whittier, *Virginia-Maryland Regional College of Veterinary Medicine*, *Blacksburg*.

The objective of the study was to determine the effect of body condition score (BCS) at initiation of synchronization on estrus expression, and AI and breeding season pregnancy rates. Data collected between 2004 and 2007 AI breedings that occurred on eleven beef farms were evaluated retrospectively. Cows (N=4885) were synchronized with progesterone supplemented protocols. The BCS (1-emaciated; 9-obese) of all cows were recorded on Day 0 of synchronization. On Day 7, all cows received a Kamar heatmount device. Cows in estrus were observed for 30 min in the morning, noon and later afternoon on Day 9 and at the time of AI on Day 10. A cows was determined to be in estrus if it was visually observed to stand for mounting or based on if it had an activated, lost (with mount marks) or partially activated Kamar device. Natural service bulls (approximately 1:40 bull:cow ratio) were introduced 14 days after AI and maintained for a 45 to 50 d breeding period. Cows were examined for pregnancy at 57 days and at 120 days after AI by palpation per rectum and/or transrectal ultrasonography to distinguish AI pregnancy from sire pregnancy. Glimmix procedure was employed to analyse the effect of BCS on estrus expression, and AI and breeding season pregnancy rates. The BCS ranged from 3 to 8. The estrus expression, and AI and breeding season pregnancy rates were influenced by BCS ($P<0.01$). The estrus expression for corresponding BCS was 3-41.2%, 4-37.9%, 5-58.0%, 6-57.9%, 7-57.9% and 8-39.3%. The AI pregnancy rates were 35.3, 47.7, 52.1, 55.0, 53.8 and 44.3 for the BCS from 3 to 8 respectively. The overall pregnancy rates 76.4, 84.7, 88.0, 90.2, 89.2, and 87.0 for the BCS from 3 to 8 respectively. The BCS of beef cows at the time of initiation of synchronization protocol influenced the estrus expression, AI and overall pregnancy rates. In conclusion, a minimum BCS of 5 should be maintained during breeding season to ensure acceptable reproductive performance.

Key Words: beef cows, body condition score, pregnancy

T217 Comparison of the CIDR Select and 5 day CO-Synch + CIDR protocols for synchronizing estrus in beef heifers. P. J. Gunn*[1], K. C. Culp[1], R. P. Arias[1], R. P. Lemenager[1], K. Heaton[2], S. L. Lake[3], and G. A. Bridges[1], [1]*Purdue University*, *West Lafayette, IN*, [2]*Utah State University*, *Logan*, [3]*University of Wyoming*, *Laramie*.

The objective of this study was to compare artificial insemination (AI) pregnancy rates between the 5 d CO-Synch + CIDR (5D) and CIDR Select (CS) programs in replacement beef heifers. Crossbred beef heifers (n = 318) were equally and randomly assigned to either the 5D or CS treatment. The CS treatment consisted of insertion of an EAZI-BREED™ CIDR® insert (CIDR) for 14 d, an injection of GnRH (100 µg; Cystorelin®) 9 d after CIDR removal, and administration of $PGF_{2\alpha}$ (25 mg; Lutalyse®; PG) 7 d following GnRH. The 5D treatment consisted of GnRH and CIDR insertion, followed 5 d later by CIDR removal and administration of two 25 mg doses of PG given approximately 12 h apart. To facilitate animal handling, treatments were offset by 24 h, as the 5D treatment received the initial PG 24 h following the CS treatment. In both treatments, heifers were detected for estrus for 56 h following PG and those exhibiting estrus were AI based on the AM/PM rule. Heifers not observed in estrus were timed-AI (TAI) 72 h after PG, concurrent with GnRH administration. Ten d following TAI, bulls were placed with the heifers for approximately 45 d. Determination of AI and breeding season pregnancy rates were achieved by ultrasonography approximately 35 d after TAI and 30 d after the breeding season, respectively. Estrous response tended ($P = 0.07$) to be greater in the CS (63.5%) than in the 5D (53.5%) treatment. However, conception rate of heifers exhibiting estrus (CS; 75.2%, 5D; 76.5%), TAI conception rate (CS; 62.1%, 5D; 63.5%), AI pregnancy rate (CS; 70.4% 5D; 70.4%), and breeding season pregnancy rate (CS; 92.2%, 5D; 88.0%) did not differ between treatments. In conclusion, both the CIDR Select and the 5 day CO-Synch + CIDR were effective programs for synchronizing estrus in replacement beef heifers.

Key Words: 5 day CO-Synch + CIDR, CIDR Select, beef heifer

T218 Effect of double prostaglandin injections in the Ovsynch® protocol on serum progesterone in cycling dairy cows. J. L. Fain*, E. R. Waggoner, and J. R. Gibbons, *Clemson University*, *Clemson, SC*.

Pregnancy rates in dairy cows are low in part because corpora luteal regression following prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) is inefficient. The experimental objective was to compare serum progesterone values (P4), CL regression, and pregnancy rates following administration of the Ovsynch® (d0 GnRH, d7 $PGF_{2\alpha}$, d9 GnRH, and d10 Timed AI) protocol with a single (1PG) $PGF_{2\alpha}$ or 2 (2PG) $PGF_{2\alpha}$ injections 12 hr apart in lactating dairy cows. Holstein (n=26) and Jersey (n=7) cows, were randomly assigned to one of the two groups. Controls (n=15;1PG) or treatment animals (n=18;2PG) were evaluated ultrasonically to map ovarian dynamics daily from the first GnRH injection to d 10 (day of Timed AI) and blood was sampled in 12 h intervals beginning 12 h prior to the first $PGF_{2\alpha}$ until 12 h post Timed AI. Cows detected in estrus early were removed from the study. Both the PG1 and PG2 groups consisted of primi and multi-parous cows averaging 80 lbs of milk. Daily ovarian ultrasound indicated 40% of 1PG animals and 55.6% of 2PG animals ovulated following the initial GnRH and in all of these animals two CLs were present at the time of first $PGF_{2\alpha}$ with there being a tendency (P=0.08) for a sharper decline in P4 values in the PG2 group versus the PG1. Overall, 60% of PG1 animals and 61% of PG2 animals had a functional CL at the time of first $PGF_{2\alpha}$ as indicated by P4 values > 1.0 ng/ml and regardless of treatment luteolsysis was complete in these animals 24 h following initial $PGF_{2\alpha}$ as indicated by P4 levels <1.0 ng/ml. Initial indications show no differences (P>0.05) in pregnancy rates between 1PG and 2PG groups. In both groups, there was a higher tendency (P=0.08) for animals with P4 levels < 0.10 ng/ml, 48 h following $PGF_{2\alpha}$ to be diagnosed pregnant at d 35 ultrasound versus those animals with P4 levels > 0.10 ng/ml at the same time point. An important note is the tendency (P= 0.07) for animals in the PG2 group to have P4 levels <0.10 ng/ml during the sampling time. Though not significant, 72% of the PG2 group showed secondary signs of estrus compared to 60% in the PG1 group. Further research is needed to fully investigate these dynamics.

Key Words: Ovsynch, P4, dairy

T219 In vitro assessment of corpus luteum function in cows induced to ovulate with porcine LH, GnRH or estradiol benzoate. D. J. Ambrose*[1,3], M. G. Colazo[1], J. P. Kastelic[2], T. O. Ree[3,4], M. K. Dyck[3], P. Ponce Barajas[1,3], and A. G. A. Lamont[1,3], [1]*Alberta Agriculture and Rural Development*, *Edmonton, AB, Canada*, [2]*Agriculture and Agri-Food Canada*, *Lethbridge, AB, Canada*, [3]*University of Alberta*, *Edmonton, AB, Canada*, [4]*Lakeland College*, *Vermilion, AB, Canada*.

Objectives were to compare CL structure and function in nonlactating Holstein cows ovulating spontaneously or following treatment (during proestrus) with porcine LH (pLH), GnRH, or estradiol benzoate (EB). Cows (n=28) were given a 1.9 g progesterone (P4) intravaginal device (CIDR) for 5 d and 500 µg cloprostenol (PG) at CIDR removal. On d 6 (estrus = d 0), all cows received PG twice, 12 h apart, and were allocated to receive: no treatment (Control); 1 mg EB 20 h after first PG; 12.5 or 25 mg pLH or 100 µg GnRH 36 h after PG. Cows (n=4/group) were ovariectomized on d 12. The CL weight (g) was greater (P<0.05) in Control (6.1±0.5) than in GnRH-treated cows (4.5±0.5) but not different from other groups (mean, 5.5±0.5). Preovulatory follicle diameter was correlated to CL weight (P<0.03, r=0.47). The no. of small luteal cells / unit area (235.6±18.2) did not differ (P>0.05) among groups. However, CL of cows given GnRH had fewer (P<0.05) large luteal cells per unit area (25.5±4.4) than that of EB (41.8±4.4) or Control (40.0±4.4); also, 12.5 mg pLH (27.8±4.4) differed from EB (P<0.05). GnRH-induced CL had more (P<0.02) capillary cells (57.0±8.3) than Control (26.0±8.3). The number of fibroblasts in the CL was greatest (P<0.05) in cows treated with 12.5 mg pLH (96.8±7.6) than in all other treatments (mean, 60.4±7.6). Portions of CL (250 mg, as 3-4 mm cubes) were cultured for 2 h in vitro in modified Eagle′s medium (DMEM) with 0, 20 or 40 ng/mL bovine LH. Although mean plasma P4 concentration (ng/mL) on d 12 was lower (P<0.05) in cows induced to ovulate with 12.5 mg pLH (4.8±0.6) than in GnRH-treated cows (6.7±0.6), in vitro P4 production (ng/mL) was not affected by either in vivo treatment (13.2±0.7) or LH dose in vitro (13.3±0.7).

Key Words: corpus luteum, progesterone, in vitro

T220 Reproductive performance of grazing dairy cows following presynchronization and resynchronization protocols. E. S. Ribeiro*, R. L. A. Cerri, R. S. Bisinotto, F. S. Lima, F. T. Silvestre, W. W. Thatcher, and J. E. P. Santos, *University of Florida*, *Gainesville*.

Objectives were to evaluate reproductive performance of grazing dairy cows subjected to different presynchronization and resynchronization protocols. Lactating cows (n=1268) in two dairies were blocked by parity, breed (Holstein, H=538; Jersey, J=235; and Holstein/Jersey Cross, C=494), and d postpartum, and then randomly assigned to 1 of 4 treatments in a 2x2 factorial: 1) Presynch: 2 injections of PGF given 14 d apart and starting the timed AI (TAI) protocol 11 d later; 2) G6G: injection of PGF followed 3 d later by GnRH and starting the TAI protocol 6 d later. The TAI protocol consisted of GnRH on d 0, PGF on d 5 and 6, and GnRH+TAI on d 8. On d 12 after the TAI, half of the cows in each presynchronization received one of the two resynchronizations: 1) RCON, cows were observed daily for estrus and inseminated starting on d 19 after TAI; 2) RCIDR, cows received a CIDR from d 12 to 19 after the TAI and were observed for estrus starting on d 19. Cows in estrus were inseminated. Blood was sampled and analyzed for progesterone on the first GnRH of the TAI. Pregnancy per AI (P/AI) was determined 30 and 60 d after the first TAI. The proportion of cows in estrus at timed AI did not differ (P=0.61) between Presynch and G6G (41.0 vs. 41.7%), but it was less (P=0.003) for H than J and C (29.6 vs. 47.7 vs. 46.4%). P/AI following the first TAI were 48.6 and 51.9% for G6G and Presynch (P=0.60), respectively. Method of resynchronization did not (P=0.65) influence P/AI; however, H had less (P=0.03) P/AI than J and C (42.2 vs. 54.2 vs. 54.0%). Cows in estrus at TAI had greater (P=0.004) P/AI than those not in estrus (57.9 vs. 44.9%). Although resynchronization influenced the pattern of return to estrus, it did not influence (P=0.96) the proportion of nonpregnant cows re-inseminated before d 30 (RCIDR=72.1 vs. RCON=71.5%). Breed influenced (P=0.05) the proportion of nonpregnant cows that was re-inseminated, and it lowest for H (66.0%) followed by C (72.0%) and then J (83.1%). Breed but not reproductive program influenced reproductive performance of grazing dairy cows.

Key Words: dairy cow, grazing, reproduction

T221 Follicular wave of the ovulatory follicle and not cyclic status influences fertility of dairy cows. R. S. Bisinotto*[1], R. C. Chebel[2], and J. E. P. Santos[1], [1]*University of Florida*, *Gainesville*, [2]*University of California Davis*, *Tulare*.

Two studies evaluated the influence of follicular wave at AI on fertility of dairy cows. In EXP1, data from 5,630 lactating cows enrolled in a

presynchronized timed AI protocol were analyzed. Cows had blood analyzed for progesterone (P4) 12 to 14 d apart, on the days of second PGF of the presynchronization and the first GnRH (GnRH1) of the timed AI protocol (Ovsynch or Cosynch72). Cows were classified as cyclic if P4>1 ng/mL and anovular if both samples had P4<1 ng/mL. Cyclic cows were categorized as low (CLow: <1 ng/mL) or high (CHigh: ≥1 ng/mL) P4 on the day of GnRH1, which would result in ovulation of the dominant follicle of the first (FW) and second (SW) follicular waves, respectively, at AI. Pregnancy per AI (P/AI) was determined 31 and 66 d after AI. In EXP2, 220 Holstein received 2 PGF given 14 d apart. The Ovsynch protocol (GnRH, 7 d PGF, 48 h GnRH, 12 h timed AI) initiated either 3 or 10 d after the second PGF to result in insemination to the FW or SW dominant follicles. Blood was analyzed for P4 and ovaries were scanned on the days of the second PGF of the presynchronization, GnRH1 and PGF of the Ovsynch. Only cyclic cows were enrolled. Pregnancy was determined on days 32 and 66 after AI. In EXP1, P/AI on d 31 was greater (P<0.001) for CHigh than anovular and CLow cows (43.0 vs. 29.7 vs. 31.3%, respectively). Short-cycling differed (P<0.001) among groups and were 7.1, 11.9, and 15.7% for CHigh, anovular and CLow, respectively. Pregnancy loss differed (P<0.05) only between anovular and CLow (10.0 vs. 15.0%), and it was intermediate for CHigh (13.5%). In EXP2, 9.8 and 97.2% of the FW and SW cows, respectively, had P4>1ng/mL at the GnRH1. Concentrations of P4 at GnRH1 (0.4±0.1 vs. 2.6±0.1 ng/mL) and PGF (2.1±0.2 vs. 2.9±0.2 ng/mL) were greater (P<0.002) for SW than FW cows. P/AI was greater (P=0.04) for SW than FW cows (41.7 vs. 30.4%), despite less (P=0.05) ovulation to GnRH1 in SW than FW cows (78.7 vs. 88.3%). These data indicate that follicular wave of the ovulatory follicle and not cyclic status influences fertility of dairy cows. Synchronization programs that induce ovulation of the FW follicle reduced P/AI of cows.

Key Words: anovular, dairy cow, follicular wave

T222 Resynchronization strategies to improve fertility in lactating dairy cows utilizing a presynchronization injection of GnRH or supplemental progesterone: II. Economic evaluation. L. G. D. Mendonça*[1], S. T. Dewey[2], G. Lopes Jr.[1], F. A. Rivera[1], F. Guagnini[1], J. Fetrow[4], T. R. Bilby[2,3], and R. C. Chebel[1], [1]*Veterinary Medicine Cooperative Extension, University of California Davis, Tulare*, [2]*Department of Animal Sciences, University of Arizona, Tucson*, [3]*Texas A&M AgriLife Research and Extension, Texas A&M System, Stephenville*, [4]*Veterinary Population Medicine, University of Minnesota, St. Paul*.

Objectives were to evaluate economics of resynchronization protocols for lactating dairy cows in 2 farms in CA and AZ. One week before pregnancy diagnosis (32±3 d post-AI) cows were enrolled in the study and assigned to 1 of 3 resynchronization protocols after balancing for parity, DIM, and number of AI. Treatments were control (CON), GGPG, and CIDR. GGPG cows received an injection of GnRH at enrollment (32±3 d post AI). At non-pregnancy diagnosis all cows were submitted to a timed AI (TAI) protocol (GnRH, 7 d later PGF, and 72 h later GnRH and TAI). CIDR cows received a CIDR insert at first GnRH until PGF injection. Cows were examined for pregnancy 39±3 d post-AI. For economic evaluation, parameters used were pregnancy value=$275, and cost of PGF=$1.5, GnRH=$1.5, CIDR=$10, and labor=$10/h. Number of cows submitted to resynchronization were CON=386, GGPG=357, and CIDR=316. Costs of resynchronization protocols for non-pregnant cows were (P<0.01) different (CON=$5.1±0.1, GGPG=$10.1±0.1, CIDR=$14.9±0.1). Pregnancy at 60 d after resynchronized AI was greater (P<0.02) for GGPG (30.9%) and CIDR (29.9%) cows than CON (22.2%). Average value of cows was greater (P=0.01) for GGPG ($85.86±7.07) than CON cows ($60.92±6.98), with CIDR cows ($75.99±7.53) not differing (P>0.10) from CON or GGPG cows. Average return per cow submitted to the resynchronization protocol tended to be affected by treatment, being GGPG treatment ($71.25±6.67) greater return than CON ($53.02±6.51), but CIDR ($63.88±7.07) was not different from CON or GGPG. By altering assumptions for pregnancy value from $100 to $500 ($50 increments), CIDR insert cost from $5 to $15 ($2.5 increments), and GnRH injection cost from $1 to $5 ($0.5 increments), 81 scenarios were generated and used to evaluate resynchronization protocols when proportion of cows not pregnant to pre-enrollment AI ranges from 20 to 70% (5% increments). The GGPG ($32.71±2.25) and CIDR ($32.59±2.25) treatments had (P<0.05) a greater average return than CON ($26.05±2.25), but no difference between GGPG and CIDR treatment was observed.

Key Words: resynchronization, dairy cow, economics

T223 Low progesterone concentration during superstimulation of the first follicular wave impairs embryo quality of lactating dairy cows. F. A. Rivera*[1], L. G. D. Mendonça[1], G. Lopes Jr.[1], R. V. Perez[1], F. Guagnini[1], M. Amstalden[2], R. G. S. Bruno[1], J. E. P. Santos[3], and R. C. Chebel[1], [1]*Veterinary Medicine Cooperative Extension, University of California Davis, Tulare*, [2]*Animal Reproduction Laboratory, Texas A&M University Agricultural Research Station, Beeville*, [3]*Department of Animal Science, University of Florida, Gainesville*.

Objectives were to determine the influence of progesterone (P4) concentration during superstimulation of the first follicular wave on embryo quality of lactating dairy cows. Holstein cows (n = 102) were enrolled in 1 of 3 treatments (first follicular wave, FW; first follicular wave with CIDR, FWC; and second follicular wave, SW). All cows received GnRH+CIDR, followed 7 d later by PGF2∝ and CIDR removal, and 2 d later cows received a second GnRH (study d 0). FW and FWC cows started the superstimulation on d 1, and SW cows received GnRH on d 6 and started the superstimulation on d 7. Cows were received 400 mg of FSH given twice daily for 5 d, and PGF2∝ concurrent with the ninth and tenth FSH injections. FWC cows received 2 CIDR inserts during superstimulation. All cows received GnRH 48 h after the first PGF2∝ and were inseminated 12 and 24 h later. Embryos were recovered 7 d after AI and embryos were classified according to IETS (grade 1, excellent/good; grade 2, fair; grade 3, poor; and grade 4, degenerated). Blood was sampled at each injection of the presynchronization, daily during the superstimulation, and at AI and embryo recovery. Concentration of P4 during the superstimulation protocol was smallest (P<0.01) for FW cows (FW=0.61 ± 0.16, FWC=1.85 ± 0.14, SW=3.34 ± 0.16 ng/mL), but there was no (P=0.84) difference in P4 concentration on the day of embryo recovery. Number of embryo/oocytes recovered was not (P=0.21) affected by treatments, but treatment affected (P=0.04) and tended (P=0.09) to affect number of embryos grades 1-3 (FW = 4.0 ± 0.7, FWC = 8.1 ± 1.7, SW = 5.2 ± 1.2) and oocytes (FW=2.4 ± 0.6, FWC=1.1 ± 0.4, SW=1.1 ± 0.4) recovered, respectively. Proportion of embryo/oocytes classified as embryos grades 1-2 was smallest (P<0.01) for FW cows (FW=41.6 ± 5.6, FWC=62.9 ± 6.3, SW=71.5 ± 6.7%) and proportion classified as oocyte tended (P=0.11) to be larger for FW cows (FW=27.8 ± 5.0, FWC=14.0 ± 5.6, SW=14.4 ± 6.0). Progesterone concentration during the superstimulation of the first follicular wave affects embryo quality and fertilization rate of lactating dairy cows.

Key Words: follicular wave, progesterone, superstimulation

T224 Resynchronization strategies to improve fertility in lactating dairy cows utilizing a presynchronization injection of GnRH or supplemental progesterone: I. Pregnancy rates and ovarian responses. S. T. Dewey*[1], L. G. D. Mendonca[2], G. Lopes Jr.[2], F. A. Rivera[2], F. Guagnini[2], R. C. Chebel[2], and T. R. Bilby[1,3], [1]*University of Arizona, Department of Animal Sciences, Tucson*, [2]*Veterinary Medicine Cooperative Extension, University of California-Davis, Tulare*, [3]*Texas A&M AgriLife Research and Extension, Texas A&M System, Stephenville*.

Objectives were to evaluate three resynchronization protocols for lactating dairy cows in two farms in CA and AZ. One week before pregnancy diagnosis (32±3 d after pre-enrollment AI) cows were enrolled and assigned to 1 of 3 resynchronization protocols after balancing for parity, DIM, and number of AI. Treatments were control (CON), GGPG, and CIDR. The GGPG cows received an injection of GnRH at enrollment (32±3 d post AI). At non-pregnancy diagnosis (39±3 d) all cows were submitted to a timed AI (TAI) protocol (GnRH, 7 d later PGF, and 72 h later GnRH and TAI). The CIDR cows received a CIDR insert at first GnRH until PGF injection of the TAI protocol. In total, 1,059 cows were submitted to resynchronization protocols (CON=386, GGPG=357, and CIDR=316). In a subgroup of cows, ovaries were scanned and blood for progesterone (P4) was sampled on day of first GnRH and PGF injections. All cows were diagnosed for pregnancy at 39±3 d (PR1), and reconfirmed at either 60 or 120 d (PR2). The GGPG cows had more CL than CIDR and CON cows on day of first GnRH (1.19 vs. 0.93 vs. 0.91±0.05, respectively) and PGF (1.25 vs. 0.82 vs. 0.81±0.05) injections, but CIDR and CON cows did not differ. Greater proportion of GGPG cows had P4≥1 ng/mL on day of first GnRH than CIDR and CON cows (79.14% vs. 64.53% vs. 71.81%, respectively), but CIDR and CON did not differ. There were no differences between treatments in proportion of cows with P4≥1 ng/mL on day of PGF injection or mean P4 concentrations on day of GnRH and PGF injections. The PR1 was and tended to be greater for GGPG (33.6%) and CIDR (31.3%) cows, respectively, than CON (24.6%) cows, and GGPG (31.2%) and CIDR (29.5%) cows had greater PR2 than CON cows (22.1%). The PR1 and PR2 were not different between GGPG and CIDR cows. The interaction between treatment and BCS affected PR1 and PR2, because GGPG treatment increased PR1 and PR2 of cows with BCS>2.75, and CIDR treatment increased PR1 and PR2 of cows with BCS≤2.75. Presynchronizing cows with an injection of GnRH or use of supplemental progesterone can increase pregnancy rates.

T225 Effect of follicular replacement prior to ovsynch and use of somatotropin at insemination on pregnancy rate at first service of Holstein cows exposed to warm climate. D. R. Lozano*[1] and C. F. Aréchiga[2], [1]*Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias, Aguascalientes, Aguascalientes, México*, [2]*Universidad Autónoma de Zacatecas, Zacatecas, Zacatecas, México*.

Objective was to evaluate the effect of follicular replacement prior to Ovsynch protocol (d 0, GnRH; d 7, PG; d 9, GnRH; d 10, timed artificial insemination) as well as the use of bovine somatotropin (bST) at the time of insemination on pregnancy rates at first service. Lactating Holstein cows were assigned at random to the following treatments: 1) PG (n=80), cows were induced to estrus synchronization with 500 mg of synthetic prostaglandin; 2) PG+ bST (n=70), cows were induced to estrus with synthetic prostaglandin and received 500 mg of bovine somatotropin at the time of artificial insemination; 3) Ovsynch protocol (n=83); 4) Ovsynch + bST at the time of insemination (n=78); 5) GnRH + Ovsynch (n=72), cows received 100 µg of a GnRH analogue to induce follicular replacement 5 days before the beginning of Ovsynch protocol (d -5 GnRH-a; d 0-9, Ovsynch); 6) GnRH + Ovsynch + bST (n=73), (d -5, GnRH-a; d 0-9, Ovsynch; d 10, bST). Days in milk (DIM) and body condition score (BCS) at the beginning of treatment, and days to conception were analyzed by lineal models. Pregnancy rate to first service and postpartum distribution of pregnant cows were analyzed by Xi-square. DIM (56.4 ± 3.6) and BCS (3.0 ± 0.4) were similar among treatments (P>0.05). Follicular replacement before Ovsynch did not increase pregnancy rates to first service (35.2%) nor reduced the days to conception (122.8 ± 6.9) (P>0.05). Administration of bST did not improve pregnancy rates to first service (P>0.05). Ovsynch improved pregnancy rate to first service (36.6%) and reduced days to conception (111.1 ± 6.7 d) compared to prostaglandin program (26.6% and 136.5 ± 5.3 d, respectively) (P<0.05). 60.0% of the cows assigned to Ovsynch were pregnant in the first 93 days postpartum, such percentage was superior to ones observed in prostaglandin program (31.1%, P<0.05). Neither follicular replacement before Ovsynch nor bST at the time of insemination improved fertility at first service in lactating Holstein cows exposed to warm climate in central Mexico.

Key Words: warm season, somatotropin, fertility

T226 Dynamics of luteolysis using two $PGF_{2\alpha}$ analogs and subsequent differences in fertility. J. P. N. Martins*, R. Policelli, and J. R. Pursley, *Michigan State University, East Lansing*.

Probability of pregnancy decreases substantially in lactating dairy cows treated with Ovsynch if CL regression is delayed or incomplete. This is observed in ~10% of cows treated with Ovsynch utilizing dinoprost tromethamine (DINO). DINO has a shorter half-life (t½) of 7 to 18 minutes compared to cloprostenol sodium (CLO), which is more resistant to endogenous metabolism and maintains a higher circulating concentration for a longer time (t½ ~ 3 hours). We hypothesized that CLO could reduce the time to complete luteolysis (defined as P4 decreasing to and maintaining concentrations less than 0.5 ng/ml) and increase conception rates. In Study 1, lactating dairy cows (n=36) received the same synchronization strategy (25mg of $PGF_{2\alpha}$ – 2d later 100 µg GnRH – 6 d later GnRH – 7 d later $PGF_{2\alpha}$). At time of final $PGF_{2\alpha}$, cows were assigned randomly to receive either 500 µg CLO or 25 mg DINO. Blood samples were collected prior to (daily) and after (hourly) $PGF_{2\alpha}$ treatment to analyze circulating concentrations of P4. Utilizing ultrasound, only cows that responded to injections prior to $PGF_{2\alpha}$ treatment were included. The decline in P4 was accelerated for CLO at time points between 2 and 10 h post-injection, but not at 12, 24, 36 and 48 h in cows with complete luteolysis. Percent of cows that did not have complete CL regression did not differ between treatments. Cows that did not have complete CL regression did not ovulate (0/5). Time to complete luteolysis was 29.7 ± 1.2 vs. 29.4 ± 1.7 h, P = 0.89, and ovulation was 101 vs. 103 h, P = 0.56, in CLO vs. DINO. There was a rapid drop in P4 one hour after $PGF_{2\alpha}$ then complete rebound 1 h later followed by a steady decline. In Study 2, lactating dairy cows were treated with a pre-synch/Ovsynch program comparing DINO vs. CLO (n=652) to determine differences in fertility of the two products. There was a tendency for greater conception rates in CLO vs. DINO (41 vs. 36%; P=0.11) with similar differences within each parity. In summary, there was a difference in the dynamics of luteolysis early but not late following CLO or DINO and a trend for greater conception rates following CLO.

Key Words: cloprostenol sodium, dinoprost tromethamine, luteolysis

T227 Effects of presynchronization with hCG 7 d prior to estrous synchronization and fixed-time AI (TAI) on fertility and concentrations of progesterone in suckled beef cows. G. Marquezini*[1], C. R. Dahlen[2], S. L. Bird[3], B. J. Funnell[3], and G. C. Lamb[1], [1]*North Florida Research and Education Center, University of Florida, Marianna*, [2]*Northwest Research and Outreach Center, University of Minnesota, Crookston*, [3]*North Central Research and Outreach Center, University of Minnesota, Grand Rapids*.

We determined whether hCG administered 7 d prior initiation of estrous synchronization would affect concentrations of progesterone and increase pregnancy rates. Suckled beef cows at three separate locations were stratified by days postpartum and parity and randomly assigned to two treatments: 1) cows received 100 μg of GnRH at CIDR insertion (d -7) and 25 mg of $PGF_{2\alpha}$ at CIDR removal (d 0), followed in 67 h by GnRH and TAI (d 3; control; n = 130). 2) same as control, plus cows received 1,000 IU of hCG 7 d (day -14) prior to CIDR insertion (hCG; n=129). Transrectal ultrasonography was used to determine pregnancy status on d 30. Blood samples were collected on d -25, -14, -7, 0 and 3 to determine concentrations of progesterone. Pregnancy rates were similar between control (53.4%) and hCG (54.2%). Pregnancy rates for estrous cycling cows (62.5%) tended ($P = 0.11$) to be greater than noncycling cows (47.6%); however, treatment with hCG failed to increase pregnancy rates in noncycling cows. Of noncycling cows on d -14, hCG (37.9%) induced a greater ($P < 0.05$) percentage of cows to have elevated progesterone (>1 ng/mL) than controls (17.0%) on d -7. Percentage of cycling cows was greater ($P < 0.05$) at location 3 than locations 1 and 2. In addition, location 3 had greater ($P < 0.01$) concentrations of progesterone on d -25, -14, -7, and 0 than locations 1 and 2. Concentrations of progesterone were greater ($P < 0.01$) on d -7 for hCG than control cows (1.84 ± 0.19 vs 1.22 ± 0.19, respectively), but were similar between treatments on d 0 and 3. Although pretreatment with hCG increased concentrations of progesterone and percentage of cycling cows at initiation of estrous synchronization, pregnancy rates were not enhanced.

Key Words: human chorionic gonadotropin, beef cows, estrous synchronization

T228 Comparison of two protocols to achieve pregnancy to fixed-time artificial insemination (TAI) in suckled beef cows. S. E. Echternkamp*, W. G. Hays, S. A. Jones, and R. A. Cushman, *USDA, ARS, U.S. Meat Animal Research Center, Clay Center, NE*.

Application of AI in extensive beef cattle production is limited by the necessity to monitor estrus and handle animals twice daily for several weeks. Protocols that effectively synchronize ovarian follicular development and ovulation to enable TAI would facilitate use of AI. Objective was to determine whether adding a controlled internal drug-release device (CIDR) to a GnRH-based protocol would increase blood progesterone (P4) concentrations, ovarian synchrony, and pregnancy rate to TAI. Cyclic suckled beef cows (n=1238) in 6 herds on Center received 1 of 2 treatments: 1) an injection of GnRH (100 μg i.m.) followed by 25 mg $PGF_{2\alpha}$ (PGF) i.m. 7 d later, followed by GnRH (100 μg i.m.) 60 h after PGF (CO-Synch), or 2) Co-Synch plus a CIDR during the 7-d interval between GnRH and PGF injections (Co-Synch + CIDR). All cows were bred by TAI 60 h after PGF. Cows were fitted with an Estrotect heat detector. Estrus was monitored 3 wk before and during treatment and at TAI. Blood samples were collected at GnRH (first) and PGF injections; P4 was assayed in plasma by RIA. Pregnancy was diagnosed 70 to 90 d after AI. Results did not differ among herds. Progesterone did not differ between protocols at first GnRH (4.0±0.1 ng/mL) but was greater ($P < 0.01$) at PGF injection in Co-Synch + CIDR- vs. Co-Synch-treated cows (4.6 vs. 3.5±0.1 ng/mL, respectively), and fewer CIDR-treated cows had P4 ≤1 ng/mL at PGF (10.7 vs. 28.4±1.0%, respectively). A greater ($P < 0.01$) percentage of Co-Synch + CIDR vs. Co-Synch cows expressed estrus after PGF (63.4 vs. 54.4±2.0%) and were pregnant to TAI (53.5 vs. 43.2±2.0%, respectively). For cows with P4 ≤1 ng/mL at PGF, CIDR increased pregnancy rate (59.1 vs. 27.6±2.0% with vs. without CIDR), whereas pregnancy rates did not differ between protocols when P4 was >1 ng/mL. Inclusion of a CIDR in the synchronization protocol increased plasma P4 concentrations, estrus detection, and pregnancy rates, primarily in cows with low endogenous P4 secretion.

Key Words: beef cows, progesterone, timed insemination

T229 Relationship between follicular profiles and the superovulatory responses in cattle. H. Kohram* and H. Kermani Moakhar, *Department of Animal Science, Faculty of Agriculture, Karaj, Tehran, Iran*.

The objective of this experiment was to determine the influence of follicular profiles over 4 days prior to superovulation on superovulatory responses in terms of the number of large follicles (F; ≥ 7mm) at estrus and corpus luteum (CL) 7 days later. Ultrasonography was performed once daily prior to gonadotropin treatment, on the day of estrus during superovulation and 7 days later. Animals conventionally superovulatd (400 mg Folltropin-V) between days 8 to 12 of the estrous cycles and 88 superovulation cycles were considered in the present experiment. Data were analyzed by means of the GLM procedure of the SAS. In these cases, the diameter of largest follicle (F1) and the difference between the diameter of F1 and the second largest (F2) follicle (F1-F2) responses were indicative of a morphologically dominant follicle in the growing and regressing phases in animals. Each type of superovulatory responses was divided in the three classes as low (≤4), medium (5-9) and high (≥10) numbers of F and CL, respectively. The number of superovulatory cycles with low, medium and high responses showed in Table 1. The diameters of F1 (11.8±.31 vs 10.9±1.55 and 10.9±.2) and F1-F2 (6.73±.57 vs 3.78±.59 and 4.8±.47) during 4 days before superovulation were not different (p>0.1) between the three groups of animals. In conclusion, the profile of F1 and F1-F2 before a conventional superovulatory treatment did not affect the number of large follicles at estrus and corpus luteum 7 days later.

Table 1. The number of superovulatory cycles with low, medium and high responses.

	Nb. of superovulatory cycles		
Type of responses	Low (≤4)	Medium (5-6)	High (≥10)
Follicular at estrus	9	18	61
CL 7 days after superovulation	20	21	47

Key Words: cattle, follicle, superovulation

T230 Ovarian follicular dynamics during the estrous cycle in water buffalo. H. Kohram*[1], G. Mohammadi[2], and E. Dirandeh[1], [1]*University of Tehran, Iran*, [2]*Shahid Chamran University, Ahvaz, Khoozestan, Iran*.

There are few studies done to clarify the pattern of ovarian follicular growth and manipulation of these phenomena in female buffaloes. The purpose of the present study was to characterize follicular dynamics during the estrous cycle in water buffalo. Buffaloes (n=5) were synchro-

nized with 2 intramuscular injections of prostaglandin F2Î± given 11 days apart (estrus = d 0). Ovarian follicular development was monitored daily from estrus d 0 to the next estrus by real-time ultrasonography, B-mode instrument with a 7 MHz linear-array transducer. Data were analyzed using the GLM procedure of SAS. Result showed that follicular growth during the estrous cycle occurs in a wave like pattern. The buffalo showed two wave (n=2) or three wave (n=3) of follicular growth. The first follicular wave begin at d 1.0 in buffaloes with two and three follicular waves (ovulation=d 0). The second wave appeared at d 9.5±0.5 and 8.0±0.0 d (P<0.05) for the 2 and 3 wave cycle animals, respectively. The third wave started at 14.6±0.7 d. During the two and three follicular waves the maximum diameters of the dominant follicles (±SEM) were 15.0±1.0 and 10.0±1.0, respectively. The mean length interval between ovulation in 2 and 3 wave cycles was (18.5±0.5 vs 20.3±0.5 d, P<0.05). Our results suggest that follicular growth in water buffaloes is a dynamic process, and occurs in waves.

Key Words: ultrasonography, buffalo, follicle

T231 The response to a progestin-based ovulation induction in anoestrous goats is enhanced by bovine somatotropin applied 5 days before the end of progestin treatment. A. M. Martinez, C. G. Gutierrez, Y. Dominguez, and J. Hernandez-Ceron*, *Facultad de Medicina Veterinaria y Zootecnia, Universidad Nacional Autónoma de México*, *México*.

Fertility and prolificacy are lower in anoestrous goats induced to ovulate than in cycling goats. Treatment with bST during synchronization increases fertility and prolificacy in sheep during the reproductive season. Here, we tested whether a single dose of long acting bST 5 days before the end of progestin treatment increases kidding rate and prolificacy in anoestrous goats induced to ovulate. One hundred nine cross breed goats (Boer and Alpina) varying in parity received an intravaginal sponge containing 45 mg of fluorogestone acetate, which remained in place for 12 days. On day twelve of treatment, does received 300 UI of eCG. Five days before sponge withdrawal goats were randomly assigned to two groups: bST group (n =53) received a depot injection of 125 mg sc of bST. The control group (n = 56) received equal amount of saline solution. After withdrawal of progestin treatment, goats were observed for signs of estrous, by means of a male goat fitted with an apron. Goats in estrus were mated with males of proved fertility. Treatment with bST increased (P=0.018) the proportion of goats in estrus (bST, 73% vs. control, 52%). Conception rate did not differ (P=0.12) (bST, 82% vs. control, 65%). The kidding rate was higher (P=0.005) in bST (60%) than in the control group (34%). Treatment with bST did not increase (P=0.9) the proportion of goats delivering twins (bST, 59% vs. control, 63%). IGF-I and insulin concentrations were higher (P=0.001) in goats treated with bST than in control goats. It is concluded that a single dose of bovine somatotropin 5 days before the end of progestin-based ovulation induction in anoestrous goats increases kidding rate.

Key Words: fertility, goats, bST

T232 Ovarian response to different doses of eCG after synchronization of estrous and ovulation with CIDR during 14 days in the breeding season in goats. L. F. Uribe-Velásquez*[1], M. I. Lenz Souza[2], and J. H. Osorio[1], [1]*University of Caldas*, *Manizales, Caldas, Colombia*, [2]*Federal University of Mato Grosso do Sul*, *Campo Grande, MS, Brazil*.

The objective was compare the effect of equine chorionic gonadotrophin (eCG) on the follicular dynamics and hormonal concentrations in Alpine goats, which were subjected to estrous synchronization protocols with controlled internal drug released (CIDR) devices containing progesterone for 14 days during breeding season. Female goats (n=24) were divided at random into four groups of 6 animals each. On the day of dispositive removal, the animals received 0 (T1-Control), 200 (T2), 300 (T3) and 400 UI of eCG (T4). Echographic inspection of the ovaries was conducted with a real-time scanner (ALOKA SSD 500) equipped with a transrectal 7.5 MHz linear-array transducer. During examination, the animals were fixed in a standing position. Ultrasound examination was started 1d day prior to administration of eCG until next ovulation. All ovarian follicles ≥2mm were measured, and their relative locations were recorded on an ovarian map in order to follow the sequential development. Daily plasma estradiol and progesterone concentrations were determined using RIA. The continuous variables were evaluated with the variance analyses under GLM procedures of SAS. Size of the largest follicle was smaller (P<0.01) in control animals of wave 3 (5.5± 0.50 mm) when compared with the Treatment 3 at the same wave (7.17 ± 0.35 mm). The effects of eCG on follicular growth showed higher mean number of small follicles (P<0.05) in wave 1 (T3: 11.2± 0.62) and 2 (T4: 9.6±0.22) compared with control group (4.2±0.13 and 6.2±0.14 small follicles in wave 1 and 2, respectively). There were significant differences in P4 (P<000.01) and E2 (P<0.001) concentrations. Progesterone were higher in the eCG group treated with 300 UI (4.34±0.21 ng/mL) as compared with the others groups on day 4. The animals in T3 and T4 had significantly higher concentrations of estradiol with values of 15.05±0.86 vs 17.72±0.34 pg/mL and 17.27±0.32 vs 14.64±0.85 pg/mL on days 10 and 17, respectively. The use of CIDR+eCG increased the recruitment of small follicles and accelerated the mechanism of follicular growth.

Key Words: goats, follicular dynamics, eCG

T233 Origin and fate of preovulatory follicles after induced luteolisis at different stages of the luteal phase of the estrous cycle in ewes. L. F. Uribe Velásquez*[1], M. I. Lenz Souza[2], and M. Vélez Marín[1], [1]*University of Caldas*, *Manizales, Caldas, Colombia*, [2]*Federal University of Mato Grosso do Sul*, *Campo Grande, MS, Brazil*.

The purpose of this study was to evaluate ovarian response, using transrectal ovarian ultrasonography, to 2 injections of Prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) given at differents intervals. Fourteen Bergamasca ewes were examined during the breeding season. All ewes were injected with an i.m. dose of $PGF_{2\alpha}$ analogue. Ewes were randomly allocated to two groups (n = 7) which received $PGF_{2\alpha}$ 7d (G7) or 9d (G9) after ovulation (when the dominant follicle of wave 2 was expected to be in the growing and plateau phase, respectively). Ovaries were examined daily with transrectal ultrasonography Aloka 500 with 7.5 MHz linear array transducer. Jugular vein blood samples were collected daily for progesterone (P_4) assay. Serum P_4concentration were lower in G7 that in G9 immediately before $PGF_{2\alpha}$ treatment (4.10±0.17 vs. 4.91±0.29 ng/ml., respectively; P<0.05). Mean maximum diameter size attained by the dominant follicle of wave 2 tended to be larger in the group treated in G7 when compared with G9 (5.5±0.19 vs. 4.29±0.26 mm; P<0.05). There was effect of day with total follicles (P<0.001). Number of small follicles (2-2.5 mm) was greater (4.57±0.78 vs. 8.42±1.36) at day 6, for G7 and G9, respectively, whereas no changes were observed in medium follicles (3-3.5 mm) between groups treated. The proportion of large follicles (4 mm) increased after luteolysis. Values were lower for ewes treated on G7, whereas values were more stable over time for

ewes treated on G9. In conclusion, ewes with rapid and complete luteal regression, ovulation occurred from the dominant follicle of wave 2 when the animals are treated on days 7 and 9.

Key Words: follicles, prostaglandin, ultrasonography

T234 Endocrine function and follicular growth in sheep treated with exogen progesterone. L. F. Uribe Velásquez*[1], M. I. Lenz Souza[2], and A. Correa Orozco[1], [1]*University of Caldas*, *Manizales, Caldas, Colombia*, [2]*Federal University of Mato Grosso do Sul*, *Campo Grande, MS, Brazil*.

The effects of progesterone (P_4) on ovarian follicular growth and reproductive endocrinology were studied. Fourteen ewes, synchronized using prostaglandin ($PGF_{2\alpha}$), were randomly divided in two groups (n=7/group); control group and progesterone-treated group (CIDR) after ovulation (day zero). From one day before PG injection until day 10, ultrasonic scanning was carried out transrectally while the animals were fixed in a standing position using an Aloka SSD-500 with a 7.5 MHz for to establish follicular growth. Blood samples were collected from one day before PG until day 10 post-ovulation and serum concentrations of P_4 were determined by radioinmmunoassay. For profile of luteinizing hormone (LH) pulses, blood samples were collected at 30-min intervals for a period of 8h on days one and six. LH were determined by previously validated radioinmmunoassay. The growth rate was different between groups (P<0.001), being 0.91±0.15 and 0.70±0.16mm/d for control and treated group, respectively. Mean concentrations of P_4 (P<0.001) were different between treatments, with values on the day of maximum follicular growth of 3.82±0.17 ng/ml (control) and 5.56±0.56 ng/ml (treated). Mean plasma LH concentration and LH pulse amplitude there were no significant differences between groups (P<0.05). Differences in LH pulse frequency on day one (P<0.01) and day six (P<0.05) were observed (Table1). These data suggest that the inhibitory effects of exogen P_4 on the diameter of dominant follicle was mediated by reduced LH pulse.

Table 1. Mean LH concentrations (µg/L) and LH pulse frequency (pulse/8h) and amplitude (µg/L) on day one and day six of the estrous cycle (Mean ± SD).

Day	Group	Concentration	Pulse amplitude	Pulse frequency
1	Control	0.66±0.11 a	0.33±0.30 a	2.55±0.09 a
1	Treated	0.56±0.27 a	0.42±0.21 a	1.49±0.11 b
6	Control	0.68±0.11 A	0.87±0.30 A	2.20±0.09 A
6	Treated	0.58±0.27 A	0.70±0.21 A	1.22±0.11 B

Mean with different letters within columns differ: a vs b (P<0.01) y A vs B (P<0.05)

Key Words: follicular dynamic, LH, progesterone

T235 Real time PCR quantification of mRNA expression in the corpus luteum of cows induced to ovulate following different hormonal treatments. P. Ponce Barajas*[1,2], M. G. Colazo[1], J. P. Kastelic[3], M. K. Dyck[2], and D. J. Ambrose[1,2], [1]*Alberta Agriculture and Rural Development*, *Edmonton, AB, Canada*, [2]*University of Alberta, Dept of Agricultural Food and Nutritional Science*, *Edmonton, AB, Canada*, [3]*Agriculture and Agri-Food Canada*, *Lethbridge, AB, Canada*.

The objective was to determine if the expression of genes involved in steroidogenesis (StAR, P450scc) or otherwise relevant to CL function (NR3C1, VEGFA, FAS, EP2, PGHS2, SREBP1, OCT4, OXTR, and PGFR) differed among CL formed spontaneously or after ovulation induced with GnRH, porcine LH, or estradiol benzoate (EB). Twenty-four cows were induced to ovulate naturally without any treatment (Control; n=4) or with 1 of 4 treatments [12.5 mg pLH (n=4), 25 mg pLH (n=6), 100µg GnRH (n=5) or 1 mg EB (n=5)]. On Day 12 post ovulation, ovaries were surgically removed for the total RNA (1µg) purification from CL tissue sections using TRIzol®Plus kit for a two-step real-time Q RT-PCR analysis with Power SYBR® Green PCR Mix in a 7900HT Fast Real-Time PCR System. Data obtained as cycle threshold (C_T) value, were normalized in the comparative C_T method using a normalization factor of the geometric mean of three selected house keeping genes (H2AFZ, G3PDH and SDHA). Data were transformed with control group mean as calibrator (Vandesompele et al. 2002; Genome Biol. 3/7/research/0034). GLM procedure was used to analyze the data and comparison of means performed using the pdiff option in SAS. No statistical differences were evident in the expression of most genes analyzed. The expression of StAR in CL of cows induced to ovulate with 12.5 mg pLH tended (P<0.07) to be greater than in Control (1.94 vs. 1.00), whereas the expression of OXTR gene was lower in CL induced after EB and GnRH treatments, relative to Control (0.33 and 0.29 vs. 1.00; P<0.05).

Key Words: corpus luteum, gene expression

Production, Management and the Environment: Dairy

T236 A stochastic decision support system tool for dairy expansion. J. Janowski* and V. E. Cabrera, *University of Wisconsin*, *Madison*.

Study objectives included addressing specific producer needs during periods of herd growth and developing a stochastic decision support system tool employed for risk management in dairy production and expansion. Three million lactations from the past five years have been compiled in a database which includes monthly recordings of milk and component production, pregnancy status, and culling decisions. Simulation based on those records will guide the development of best management practices using identified performance measures as benchmarks. Markov chain simulation assigns probabilities to predicted performance levels of individuals or groups of cattle within specific time periods. Creation of a decision support system tool with functions designed for modeling herd structure and production over time will allow users to run "what-if" analyses adapted to a wide variety of herd management and economic conditions. Four bred heifer purchasing strategies were evaluated over a 54-month period and income over variable cost calculations were conducted to identify optimal herd growth strategies for a herd that grew from 150 to 300 cows. A strategy which involved purchasing 98 bred heifers within the first three months of the expansion phase