ABSTRACTS
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*** Author Presenting Paper**

Physiology: Control of the estrous cycle and pregnancy

M1 Induced twinning by artificial insemination and embryo transfer fails to increase pregnancy rates but increases total fetus numbers in beef cows. G. C. Lamb*[1], R. C. Wasson[1], D. R. Brown[1], and C. R. Dahlen[2], [1]*North Central Research and Outreach Center, University of Minnesota, Grand Rapids 55744,* [2]*North West Research and Outreach Center, University of Minnesota, Crookston, 56716.*

We determined whether induced twinning would increase fertility and twinning rates, and to elucidate factors responsible for altering twinning rates in suckled beef cows. Two hundre ninety-seven suckled beef cows were estrous synchronized with 7-11 Synch (i.e., melengestrol acetate [0.5 mg/head/d] from d -18 to d -11, $PGF_{2\alpha}$ on d -11, GnRH on d -7, and $PGF_{2\alpha}$ on d 0). Forty-eight hours later (d +2) all cows received a second 100 μg injection of GnRH and were assigned randomly to one of three treatments: 1) Fixed-time artificial insemination on day +2, (AI; n = 99); 2) a direct transfer embryo placed in the uterine horn ipsilateral to the ovary containing a corpus luteum (CL) on d +9, (ET; n =99); and, 3) a fixed-time AI on d +2 and an embryo on d +9 (TWIN; n =99). Blood samples were collected on d -29, -18, 0, +2, +7 to determine concentrations of progesterone. Ultrasonography was used to monitor follicle diameter on d +2, CL diameter on d +9 and to determine the presence of embryos on d 35. Only 34% of all cows were cycling by d -18, pregnancy rates were greater ($P < 0.05$) for TWIN (48%) and AI (46%) than for ET (33%) treated cows. Of the 48 pregnant cows in the TWIN treatment 19 were twin pregnancies (40%), whereas there was one twin pregnancy in the AI treatment and 0 twin pregnancies in the ET treatment. As a result, TWIN cows had more fetuses ($P = 0.01$) as a percentage of all treated cows (68%) than AI (47%) or ET (33%) treated cows. On d -18, A greater percentage of primiparous cows (57%) were cycling than multiparous cows (26%), resulting in greater ($P < 0.05$) overall pregnancy rates in primiparous (54%) than multiparous (40%) cows. Days postpartum on d 0 were greater ($P < 0.01$) for primiparous (79 2 d) than multiparous (68 1 d) cows. In the TWIN treatment, the correlation coefficient between concentrations of progesterone on d -7 and CL volume was 0.499 ($P < 0.001$), whereas the correlation coefficient between CL volume and the incidence of twins was 0.299 ($P < 0.01$). Embryo grade or stage of development failed to affect twinning rates. We concluded that transferring an embryo into a cow after timed-AI increased twinning rates, but failed to increase overall pregnancy rates compared to a fixed timed-AI.

Key Words: Twinning, Beef cows, Artificial insemination

M2 Effect of administration of GnRH on day 5 or day 5 and 11 post-insemination on pregnancy rates and serum progesterone concentrations in dairy cows during different seasons. A. E. Sweetman*, L. I. Nordbladh, and C. S. Whisnant, *North Carolina State University, Raleigh, NC.*

Heat stress has been shown to reduce reproductive performance in lactating dairy cows. One effect of heat stress is to decrease serum progesterone (P4) concentrations. Lower serum P4 may be associated with decreased pregnancy rate. Previous research suggested that administration of hCG on day 5 post-insemination or use of GnRH at day 11 post-insemination could increase serum P4 and improve pregnancy rates in cattle. The objective of the current experiments was to compare the response to supplemental GnRH in heat stress and cool environments. Lactating Holstein cows were bred at a timed AI after use of the Ovsynch protocol in either summer (heat stress) or winter. Controls (CON n = 35) received no further treatment. GnRH (100 ug, Fertagyl, Intervet) was administered either on day 5 (D5 n = 42) or day 5 and 11 (D5+11 n = 39) post-insemination and blood samples were collected and rectal temperatures were measured every other day beginning 3 days after AI. Concentrations of P4 were compared between treatments using the GLM procedure of SAS for repeated measures. Pregnancy rates were compared using Chi square. The results from summer follow. Summer THI (70.2) indicated mild heat stress. Serum P4 levels were higher in D5 cows ($P< 0.01$) on days 9, 11, and 13 and were higher than P4 concentrations in CON cows ($P< 0.01$) on days 17 and 19 in D5+11 cows. Rectal temperatures did not differ between groups. Pregnancy rates as assessed using ultrasonography on day 30 post AI were higher ($P< 0.05$) in D5 ($35.2 \pm 2.4\%$) compared with CON ($18.5 \pm 1.3\%$) and D5+11 ($20 \pm 1.7\%$). In experiment 2, a similar protocol was performed except during winter when heat stress conditions did not exist (THI = 44.8). Serum P4 concentrations were higher in GnRH treated cows than in CON as in summer. However pregnancy rates did not differ between groups (CON $37.2 \pm 2.7\%$; D5 $39.3 \pm 2.9\%$; D5+11 $34.4 \pm 2.2\%$;) unlike the results in summer. These results suggest that administration

of GnRH can increase serum P4 concentrations in lactating dairy cows during both heat stress and cooler conditions but that pregnancy rates were increased only during heat stress.

Key Words: Heat stress, GnRH, Progesterone

M3 Effect of treatment with hCG or GnRH on day 5 after AI on conception rates in lactating dairy cows during the summer.

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This study evaluated the effect of GnRH or hCG injection on day 5 after AI on conception rates in lactating dairy cows during the summer. Lactating Holstein cows, 158, producing 26±9 kg milk/d and 213±112 DIM, were randomly assigned to one of 3 treatment groups: G1 (N=52), control; G2 (N=55), 100 mcg i.m. of gonadorelin (Cystorelin®); and G3 (N=51), 2500 UI hCG i.m. (Vetecor®). Experiment was conducted during the summer in Brazil. Rectal temperature was checked at the moment of AI, and blood samples were collected on days 5, 7 and 12 after AI to evaluate serum progesterone (P4) concentrations. Pregnancy was determined between 42 and 49 d after AI. Data were analyzed by the MIXED procedure of SAS, and were included in the model the effects of treatment, parity, milk production, rectal temperature at the moment of AI and interactions. Treatment with GnRH and hCG increased serum P4 (P<.01). Serum P4 concentrations (ng/ml) for G1, G2, and G3 were, respectively, on day 5, 2.71, 2.45, and 3.23, on day 7, 4.79, 4.15, and 5.75, and on day 12 after AI, 5.21, 6.91, and 8.50. Due to the proportional increases in serum P4 concentrations from d 5 to 7 after AI, it is likely that treatments did not have luteotropic effects on the existing CL, but due to the higher increase in serum P4 on day 12, probably induced formation of a new CL. The average rectal temperature of cows at the time of AI was 39.7°C. Treatment with GnRH and hCG increased conception rates in cows with rectal temperature below 39.7°C (10.1, N=26; 36.8, N=27; and 32.8%, N=21; P<.01), but had no effect on conception in cows with temperature above 39.7°C (15.2, N=26; 17.8, N=28; and 24.4%, N=30; P>.15). These data suggest that GnRH and hCG increase conception rates in lactating cows by increasing serum P4 concentrations. The positive effects of treatments were not detected in cows with high rectal temperature probably because of the deleterious effects of thermal stress on fertilization and early embryo development.

Key Words: hCG, GnRH, Conception

M4 The effects of supplemental GnRH administration following Ovsynch on pregnancy rates of lactating dairy cattle during the summer and fall seasons.

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High environmental temperatures are negatively correlated with reproductive efficiency in dairy cattle, as evidenced by lower conception rates. Studies were conducted in the summer and fall seasons respectively to evaluate the efficacy of supplemental GnRH injections post-breeding on pregnancy rates in lactating dairy cattle. Lactating dairy cows in Study 1-Summer (n=43) and Study 2-Fall (n=79)were synchronized using the Ovsynch protocol, bred (TAI) and assigned to one of three post-TAI GnRH treatment groups: Control (CON), D 5 & 11 (GnRH-5/11), and D 11 (GnRH-11). Blood samples were collected throughout the trials for evaluation of serum progesterone (P4) in relation to GnRH treatment. CL area and numbers were determined by ultrasonagraphy on D 5, 11, and 17 post-TAI for all cows in Study 1-Summer, and a subset of cows in Study 2-Fall (n=12/treatment). Rectal temperatures (RT) were collected throughout both studies, and ambient temperature-humidity index (THI) recorded daily. Study 1: Overall THI (24-h) was 74 (mild heat stress), with no differences (P>0.10) in RT between treatment groups. On D11 post-TAI, GnRH-5/11 cows had higher (P<0.05) serum P4 than CON cows, but did not differ (P>0.10) from GnRH-11 cows. On D17 post-TAI, GnRH-5/11 cows had higher (P<0.05) serum P4 than either the CON or GnRH-11 cows. Overall CL area did not differ (P>0.10) among treatment groups, yet GnRH-5/11 cows had higher (P<0.05) CL numbers on D 11 and 17 post-TAI than either the CON or GnRH-11 cows. Pregnancy rates did not differ (P>0.10) with respect to treatment. Study 2: Overall THI (24-h) was 50 (no heat stress), with no differences (P>0.10) in RT between treatment groups. On D11 post-TAI, GnRH-5/11 cows had higher (P<0.05) serum P4 than CON cows, but did not differ (P>0.10) from GnRH-11 cows. On D17 post-TAI, serum P4 did not differ (P>0.10) among treatment groups. Overall CL area did not differ (P>0.10) among treatment groups, yet GnRH-5/11 cows had higher (P<0.05) CL numbers on D 17 post-TAI than either the CON or GnRH-11 cows. Pregnancy rates did not differ (P>0.10) with respect to treatment. In summary for both trials, supplemental GnRH post-TAI increased serum P4 and CL numbers but did not increase pregnancy rate.

Key Words: Dairy cattle, GnRH, Progesterone

M5 Effect of bovine somatotropin and breed of recipient on pregnancy rates following timed embryo transfer with in vitro produced embryos.

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Administration of bovine somatotropin (bST) improves pregnancy rates following timed artificial insemination in lactating dairy cows. Two experiments tested whether bST administration to non-lactating recipients improves pregnancy rates following transfer of in vitro produced (IVP) embryos. In exp. 1, Braford cows were synchronized using the OvSynch protocol. On d -1 (d 0 = anticipated ovulation), recipients were treated with bST or not. Embryos were transferred to all recipients having a palpable corpus luteum on d 7. Pregnancy was diagnosed on d 30 and 90. In exp. 2, recipients of 3 breed types [Angus (A), Holstein (H), and Brahman or Brahman crossbreds (B)] were given bST or not on d 0. Pregnancy was diagnosed between d 42 and 49. Other procedures were as for exp. 1. There was no difference in pregnancy rates between control and bST recipients in exp. 1 (d 30, 4/14 = 28.6% vs. 2/13 = 15.4%; d 90, 3/15 = 20.0% vs. 1/14 = 7.1%) or 2 (7/36 = 19.4% vs. 5/24 = 20.8%). In neither experiment did bST affect body condition, ovulation synchronization rate (determined by plasma progesterone (P_4) concentrations on d 0 and 7), or plasma P_4 on the day of transfer. In exp. 2, synchronization rate and plasma P_4 concentrations were similar across breeds, but pregnancy rates were lower (p<0.05) for B (0/15 = 0.0%) than for H (8/35 = 22.9%) and A (4/10 = 40.0%) recipients. In both experiments, there was a non-significant trend for recipients with $\leq$ 2.5 ng/ml plasma P_4 on d 7 to have lower pregnancy rates than those with plasma P_4 > 2.5 ng/ml. Results indicate that breed of recipient but not bST administration affects pregnancy rates in non-lactating recipients following timed embryo transfer with IVP embryos. (Support: USDA IFAFS #2001-52101-11318, USDA TSTAR 2001-34135-11150, and the Babcock Inst. for International Dairy Res. & Dev., UW-Madison).

Key Words: Bovine somatotropin, IVP embryos, Timed embryo transfer

M6 Synchronization protocols in lactating crossbred Holstein-Gir cows.

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This trial was designed to compare synchronization protocols in lactating crossbred cows in a grazing based dairy system. This study was conducted between December (2001) and February (2002) in Brazil. Cows producing 13.8 ±4.0 kg milk/d and 99.8 ±73.6 DIM, were randomly assigned to one of the four groups: G1) Control (N=51), which consisted of AI 12h after heat detection (HD); G2) CIDR in (Eazi-Breed CIDR®) + GnRH (Cystorelin®, 50mcg, i.m.) - 6d # CIDR out + PGF2α (Lutalyse®, 25mg, i.m.) # IA - 12h after HD (N=50); G3) CIDR in + GnRH - 6d #CIDR out + PGF2α - 24h - ECP (ECP®, 1mg, i.m.) - 48h # AI (N=52); G4) CIDR in + GnRH - 6d # CIDR out + PGF2α - 36h # GnRH - 12h - AI (N=53). Cycling status was determined by two ultrasound examinations at days #10 and 0 (first GnRH). Data were analyzed by CATMOD procedure of SAS and were included in the model groups, parity, milk production, BCS at day of first GnRH, DIM and interactions. Interaction between parity and group was detected (P<.05) for the TAI protocols. Pregnancy rate (PR) in TAI for primiparous (PC) and multiparous cows (MC) were 25.0% (7/28) and 50.0% (12/24) for G3 compared to 37.9% (11/29) and 16.7% (4/24) for G4, respectively. Conception rate (CR) to first service for PC and MC (P=.34), were 62.5% (10/16) and 47.3% (9/19) in G1 compared to 43.7% (7/16) and 52.6% (10/19) for G2, respectively. In G3 and G4 the CR in cows effectively synchronized, for PC and MC (P<.01) were

36.8% (7/19) and 63.1% (12/19); 52.4% (11/21) and 21.1% (4/19), respectively. Interaction between parity and group (P<.05) was detected for the cumulative pregnancy rate at Day 48 (CPR). For PC and MC, CPR and number days to be confirmed pregnancy in pregnant cows were 35.7% (10/28), 30.3 ±2.4d and 56.5% (13/23), 33.5 ±3.2d; 26.9% (7/26), 9.7 ±.1d and 58.3% (14/24), 28.7 ±3.1d; 39.3% (11/28), 23.9 ±1.7d and 66.7% (16/24), 24.6 ±4.0d; 51.7% (15/29), 22.9 ±2.5d and 37.5% (9/24), 38.0 ±3.4d; for groups 1, 2, 3 and 4, respectively. In summary, protocols increased differently the PR, with ECP should replace the second GnRH in MC.

Key Words: Synchronization, ECP, GnRH

M7 Effect of incorporation of a low dose of estradiol cypionate (ECP) into a timed artificial insemination protocol on estrous behavior and conception rates in beef cattle. A. Ahmadzadeh*[1], D. G. Falk [1], R. Manzo[1], C. B. Sellars[1], and J. C. Dalton[2], [1]*University of Idaho, Moscow,* [2]*Southwest Research and Extension Center, Caldwell, ID.*

Timed artificial insemination (Ovsynch; OVS) is a convenient method to facilitate artificial insemination, however GnRH administered during the follicular phase, as occurs in Ovsynch, causes a premature decline in estradiol secretion. It was hypothesized that administration of estradiol cypionate (ECP) coupled with the second GnRH injection would improve conception rate. The objective was to determine the effect of low dose ECP incorporation into OVS on expression of estrus and conception rates in beef cattle. One hundred eighty-two British cross-bred beef cows (55-60 d postpartum) received (i.m.) injection of 25 mg PGF (d -14). Fourteen days later 100 ug GnRH was administered (i.m.;d 0) followed by 25 mg PGF on d 7. On d 9 cows were assigned randomly to receive either GnRH + 0.25 mg ECP (OVS-ECP; n=90) or GnRH + vehicle (OVS; n=92). All cows were artificially inseminated 12 to 15 h post-treatment. Estrus activity was monitored 2 times daily after second PGF administration, blood samples were collected on d 0, 7, and 9, and pregnancy determined by ultrasonography 40 and 70 d post-insemination. More cows (P < 0.05) were detected in estrus in the OVS-ECP group (43.5%) compared to the OVS group (25%). Mean serum progesterone concentrations did not differ between treatment groups on any day. Conception rate from AI was 68% and 57.5% for OVS-ECP and OVS, respectively and was not different (P = 0.14) for either d 40 or d 70 post-insemination. These results suggest that incorporation of a low dose of ECP into conventional OVS increased estrous behavior and may improve conception rate.

Key Words: Timed AI, Estradiol cypionate, Conception rate

M8 Comparison of synchronization protocols for beef heifers using melegesterol acetate, prostaglandin, GNRH, and timed artificial insemination. K. E. Miller*, W. S. Mackay, J. C. Whittier, R. M. Enns, and R. K. Peel, *Colorado State University Department of Animal Sciences*.

The objective of the study was to compare the effectiveness of MGA Select synchronization protocol to 19-d MGA-PG protocol when using timed artificial insemination (TAI) with the MGA Select protocol. Crossbred beef heifers (n = 131) were randomly assigned to one of three treatments, control, MGA Select, and MGA Select with timed artificial insemination (MSTAI). Treatment 1, control group, (n = 43) was fed melengestrol acetate (MGA) for 14 days (0.5 mg hd-1 d-1) and injected (i.m.) with PG (25 mg of Lutalyse) 19 days after the last day of MGA feeding. Treatment 2, MGA Select, (n = 44) group was fed MGA for 14 days (0.5 mg hd-1 d-1), injected (i.m.) with GnRH (100 g of Fertagyl) 12 days after the last day of MGA feeding and injected (i.m.) with PG (25 mg of Lutalyse) 19 days after the last day of MGA feeding. Treatment 3, MSTAI, (n = 44) was treated the same as MGA Select group except TAI occurred 60 hours post PG injection. Estrus detection via "Heat watch" began the day of PG and continued through 84 h for control and MGA Select groups. The estrus response was similar (P > 0.05) for the control, and treatment 2. Peak estrus period for both groups was observed to be between 48 and 60 h after PG, 53% of control and 64% of treatment 2 groups exhibited estrus (P > 0.05). Control and treatment 2 number of non-responders, those not exhibiting estrus, did not differ (P > 0.05). Comparison of conception rates for control and treatment 2 did not differ (P > 0.05). Additionally, comparison of first service pregnancy rates for treatment 2 to treatment 3 did not differ at (P > 0.05). This research suggests the use of MGA Select can be equally effective in synchronizing estrus in beef heifers as the 19-d MGA-PG protocol. Use of TAI can be used for beef heifers in conjunction with the MGA Select protocol to achieve similar first service pregnancy rates as MGA Select when used in conjunction with estrus detection.

Key Words: Timed AI, MGA select, heifer

M9 Melengestrol acetate (MGA) pretreatment or estradiol cypionate (ECP) in short duration synchronization systems to improve synchrony of estrus and ovulation in yearling beef heifers. S. K. Johnson* and J. S. Stevenson, *Kansas State University*.

The objective of this experiment was to determine if MGA pretreatment or ECP after $PGF_{2\alpha}$ would improve synchrony of estrus, ovulation, and AI pregnancy rates in heifers. Yearling Angus and Angus crossbred heifers at a commercial heifer-development facility were assigned randomly to four treatments: 1) two injections of $PGF_{2\alpha}$, 14 d apart (2XPGF, n=97), AI 6-12 h after observed estrus (EAI); 2) same as 2XPGF plus 0.5 mg of ECP 24 h after the 2nd $PGF_{2\alpha}$ injection (d 0; PECP; n=98), EAI through 72 h after $PGF_{2\alpha}$ then timed AI (TAI) and GnRH to all non-detected heifers at 74 h; 3), GnRH on d -7 and $PGF_{2\alpha}$ on d 0 and EAI (SS; n=97); 4) 0.5 mg of MGA from d -17 through d -11, $PGF_{2\alpha}$ on d -11, GnRH on d -7 and $PGF_{2\alpha}$ on d 0, EAI through 72 h after $PGF_{2\alpha}$ on d 0 then TAI and GnRH to all non-detected heifers at 74 h (7-11Synch, n=189). Doses administered were i.m.: 100 μg of GnRH and 25 mg of $PGF_{2\alpha}$. Pregnancy was diagnosed by ultrasound 30 to 34 d after AI. From 0 to 72 h after $PGF_{2\alpha}$, average interval to estrus was greater (P<0.01) for 2XPGF than PECP but did not differ for SS or 7-11Synch, 56.4 ± 1.7, 49.6 ± 1.3, 47.6 ± 2.2, 49.0 ± 0.9 h, respectively. Proportion of heifers in estrus between 48 and 72 h was greater (P<0.01) for 7-11Synch (67%) than SS (49%) and tended to be greater (P<0.06) for PECP (70%) than 2xPGF (58%). Conception rate from 48 to 72 h was lower (P<0.01) for PECP than 2XPGF but similar for SS and 7-11Synch: 48%, 71%, 75%, and 73% respectively. Conception rate of TAI heifers in PECP and 7-11Synch treatments was 5.9% (1/17) and 9.8% (4/41), respectively. Pregnancy rate (d 0 to 5) was greater (P<0.01) for EAI treatments than TAI treatments: 60%, 55%, 54%, and 41%, for 2XPGF, SS, 7-11Synch, and PECP, respectively. MGA pretreatment and ECP after $PGF_{2\alpha}$ improved synchrony of estrus, but ECP reduced conception rates. Pregnancy rate after 3 d of AI in 7-11Synch heifers was similar to 5 d of AI in SS heifers.

Key Words: Ovulation synchronization, Progestin, Estrogen

M10 Synchronization protocol using CIDR/ECP/ PGF2α/GnRH increase conception in lactating dairy cows. J.L.M. Vasconcelos*, W. R. Garcia, R. M. Santos, T.G.R. Amaral, and V. C. Bolzani, *FMVZ - UNESP*.

The objective of this study was to evaluate the efficiency of synchronization protocols to improve pregnancy rate by improve in conception. Lactating Holstein cows (n=195), producing 30.4±1.3 kg milk/d with 90±23 DIM at the time of synchronized AI, were randomly assigned to one of 5 treatment groups: G1 (N=37), CIDR in (Eazi-Breed CIDR®) # 7d # CIDR out + PGF2α (Lutalyse®, 25mg, i.m.)# 24h - ECP (ECP®,1mg, i.m.) # 2.5d # CIDR in # 6d # CIDR out + PGF2α - 24h - ECP # 44h - AI ; G2 (N = 36), CIDR in # 7d # CIDR out + PGF2α # 24h - ECP # 2.5d # CIDR in # 6d # CIDR out + PGF2α - 48h - GnRH (Cystorelin®, 100mcg, i.m.) # 12h # AI; G3 (N = 37), CIDR in # 7 d # CIDR out + PGF2α # 48h - GnRH # 24h # CIDR in # 6d # CIDR out + PGF2α - 24h - ECP # 44h # AI; G4 (N = 35), CIDR in # 7 d # CIDR out + PGF2α # 48h - GnRH # 24h # CIDR in# 6d # CIDR out + PGF2α - 48h - GnRH # 12h # AI and G5 (N = 50), control, injection of PGF2α 14 days apart and AI after estrous detection. Data were analyzed by CATMOD procedure of SAS, and were included in the model effects of treatment, parity, ciclicity, milk production, DIM and interactions. No effects of treatment were detected on synchronization (81, 89, 89, vs. 94%) or pregnancy rates (35, 50, 32, vs. 40%) in the synchronized groups G1,G2, G3, and G4, respectively. When data of the cows effectively synchronized (CL regression and synchronized ovulation) were analyzed separately with data of G5, no differences in conception were detected between the control group (N=50; 32%) and the synchronized groups G1 (N = 30; 43%), G3 (N = 33; 36%) and G4 (N = 32; 44%), but G2 (N = 31; 58%) had higher (P =.053) conception than the control group. The conception on the second AI were not affected by treatments (P=.49), G1 (N=23; 26%); G2

(N=16; 25%); G3 (N=20; 30%); G4 (N=19; 5%); and G5 (N=25; 24%). This study suggests that the G2 protocol could improve the pregnancy rate due to increase in the conception.

Key Words: Synchronization, ECP, GnRH

M11 Concentration of estradiol-17β (E2) in milk of dairy cows; effect of injection of E2 cypionate. D. M. Henricks*, J. J. Owenby, and S. L. Gray, *Clemson University, Clemson, SC/USA*.

The objective was to measure concentration of E2 in milk samples (E2 conc; pg/2gm) taken at specified times from dairy cows treated (T) with ECP® Sterile Solution (ECP; 2mgE2 cypionate/mL) compared to E2 conc in samples taken contemporaneously from control(C) cows. Unless specified, four-quarter composite (am+pm) samples were taken from each cow on consecutive days. Cows were randomly selected/assigned to one of five groups(gp): (1) late lactation cows sampled for 5d (LL;n=15); (2) fresh cows C sampled for 7d (FC-C; 3-5d post partum[PP]; n=15); (3) fresh cows T with 2mL ECP i.m., sampled for 7d (FC-T; n=15); (4) breeding cows C (BC-C; 40-60d PP; n=16); and (5) breeding cows T with 0.5mL ECP i.m.(BC-T; n=17). To obtain BC for gp 4 and 5, cows were T with 5 mL Lutalyse® Sterile Solution, and then sampled for 4d (am and pm, not composited). Cows in estrus by the 8th milking were assigned randomly to the BC-C and BC-T gp, and sampled post-T for 3d (am and pm, not composited). A total of 75 LL, 240 FC and 506 BC samples were assayed for E2 conc using a validated RIA. Data were analyzed using ANOVA. For the LL gp, milk E2 conc (pg/2gm) varied between 27.7 and 35.4 for the 5d period. Mean E2 conc of the FC-C (8.7) and FC-T (19.5) were less (P<0.01) than E2 conc in the LL gp. Similarly, mean E2 conc of the BC-C (6.3) and BC-T (8.0) were less (P<0.01) than E2 conc in the LL gp. E2 conc was not different(P>0.01) between BC-C and BC-T. E2 conc in the FC-T gp was greater (P<0.01) than E2 conc in FC-C gp. E2 conc did not vary greatly by d of milking within the LL or BC gp. In the FC-C gp, E2 ranged from 4.8 to 16.0 and for the FC-T gp from 10.6 to 28.5 over the 8d period. In the BC gp, E2 conc was not different (P>0.05) pre- and post-ECP T. These findings indicate E2 conc in FC controls were 25% of E2 conc during LL. By 1-2 mo into lactation, E2 conc had decreased to 15-20% of E2 conc in LL. A 2 mL, but not a 0.5 mL injection of ECP gave a transient increase in E2 conc. The E2 conc in milk following ECP injection was lower than E2 conc observed in LL cows.

Key Words: Estradiol, Milk, Comparisons

M12 Timed AI (TAI) with estradiol cypionate (ECP) or insemination at detected estrus in lactating dairy cows. R.L.A. Cerri*, K. N. Galvao, S. O. Juchem, R. C. Chebel, and J.E.P. Santos, [1] *University of California Davis*.

Holstein cows, 799, from 3 dairies were blocked according to parity, BCS, and milk yield and randomly assigned to one of two treatments consisting of either TAI (Heatsynch) or insemination at estrus detection (ED). Cows received two injections of PGF2a (Lutalyse, Pharmacia Animal Health) at 37+/-3 and 51 DIM. At 65 DIM, cows received an injection of GnRH (Cystorelin, Merial Ltda), followed 7 d later by PGF2a. Cows in the ED group were inseminated after observed in estrus during the 7 d after the last PGF2a. Cows in the Heatsynch received an injection of 1 mg of ECP (Pharmacia Animal Health) 24 h after the last PGF2a and were inseminated if observed in estrus in the first 24 h or TAI 48 h after ECP. Pregnancy was diagnosed by ultrasound at 30 d after AI and reconfirmed 14 and 28 d later. Progesterone in plasma was measured at the second PGF2a, GnRH, third PGF2a, and at 48 h after the third PGF2a injections. Lactation performance was followed for the first 165 DIM. Continuous and binomial data were analyzed using the MIXED and the LOGISTIC procedures of SAS (2001), respectively. Milk yield during the first 4 months after treatment (41.5 kg/d) was similar for Heatsynch and ED (P=0.64), but cows in the Heatsynch had lower production in the month of ECP treatment (43.1 vs 44.8 kg/d; P<0.01). Conception rate was higher for cows in the Heatsynch than ED on d 30 (43.0 vs 35.6%; P=0.03) and 58 (37.5 vs 31.0; P=0.03) after AI. Heatsynch cows displaying estrus 24 and 48 h after ECP treatment had higher conception at d 30 after AI than those not displaying estrus at the moment of TAI (48.5 vs 23.6% P<0.01). Pregnancy rates were higher for cows in the Heatsynch than ED on d 30 (43.0 vs 22.6%; P<0.01) and 58 (37.5 vs 19.6%; P<0.01) after AI. Pregnancy loss between 30 and 58 d after AI was similar for Heatsynch and ED (11.0 and 12.4%; P=0.88). Conception rate in the second AI was not affected by treatment (P=0.14) and it averaged 26.7%. Timed AI with the Heatsynch protocol compared to AI following ED improved conception and pregnancy rates at first AI, and had no effect on pregnancy loss in lactating dairy cows.

Key Words: Timed AI, ECP, Dairy cows

M13 Use of CIDR devices in a synchronization of ovulation protocol using GnRH and $PGF_{2\alpha}$ for first AI service and for resynchronizing return to estrus for second AI service in Holstein dairy heifers. H. Rivera*, H. Lopez, and P.M. Fricke, *University of Wisconsin - Madison*.

Holstein dairy heifers (n=190) 13 to 14 mo of age were subjected to a 42 d AI breeding period in which heifers received AI after once daily evaluation of removed tail chalk. At AI breeding period onset (d 0), heifers were randomly assigned to receive synchronization of ovulation (100 μg GnRH, d 0; 25 mg $PGF_{2\alpha}$, d 6; 100 μg GnRH+TAI, d 8; GPG; n=96), or synchronization of ovulation as per GPG heifers but with a CIDR device inserted from d 0 to 6 (CIDR; n=94). The proportion of heifers receiving AI before d 8 was greater (p<0.01) for GPG (23.9%, 23/96) than for CIDR (0.0%, 0/94) heifers, and conception rate at 30 d post-AI did not differ between GPG (29.1%, 28/96) and CIDR (31.9%, 30/94) treatments. No treatment x AI technician interaction was detected (p=0.68); however, AI technician affected (p<0.01) conception rate (Tech 1=10.6%, 5/47; Tech 2=4.2%, 2/48; Tech 3=53.7%, 51/95). Overall pregnancy loss from 30 to 75 d post-TAI was 6.9%, (4/58) and did not differ between treatments. To synchronize second AI service, heifers (n=167) receiving TAI to first service were randomly assigned to receive either no further treatment (Control; n=85) or CIDR device insertion from d 14 to 20 after TAI (Resynch; n=82). All heifers received second AI service after removed tail chalk. Conception rate at d 42 post-AI was greater (p<0.05) for Resynch (46.9%, 23/49) than for Control (26.0%, 13/50) heifers. Proportion of heifers receiving AI from d 14 to 20 was 0.0% (0/43) for Resynch vs. 32.7% (17/52) for Control, whereas proportion of heifers receiving AI within 72h after CIDR removal was 90.7% (39/43) for Resynch vs 58.49% (31/52) for Control heifers. Inclusion of a CIDR device prevented heifers from receiving AI during the TAI protocol with no detrimental effect on conception rate, and resynchronization of estrus using a CIDR device resulted in tighter synchrony of return to estrus for second AI service. *Supported by Hatch project WIS04431 to PMF*

Key Words: Dairy heifers, Synchronization of ovulation, Timed artificial insemination

M14 Administration of estradiol cypionate (ECP) or GnRH after the end of a CIDR-based fixed-time AI program in dairy heifers. A. Garcia*, I. D. Peeler, O. A. Peralta, and R. L. Nebel, *Virginia Polytechnic Institute and State University, Blacksburg*.

An experiment was conducted to investigate the effects of estradiol cypionate (ECP) administered at the time of a CIDR device insertion on synchronization of follicular wave emergence and to compare the effects of ECP or GnRH administered 24 or 48 h after CIDR removal respectively on ovulation rate, time of ovulation, diameter of the ovulatory follicle and pregnancy rate after fixed-time AI in dairy heifers. Holstein and Jersey heifers (n = 30) 14 to 16 mo of age received a CIDR intravaginal insert (Eazi-Breed; Pharmacia Upjohn Animal Health) and 1 mg ECP (Pharmacia Upjohn Animal Health) i.m. on d 0. On d 7, CIDR devices were removed and 25 mg dinoprost (Lutalyse; Pharmacia Upjohn Animal Health) i.m. was administered concurrently. After CIDR removal, heifers were randomly allocated to receive either a 0.5 mg ECP i.m. (ECP group; n = 15) 24 h later or 100 μg GnRH (Cystorelin, Merial Limited) i.m. (GnRH group; n = 15) 48 h later. Timed AI was performed 48 to 72 h after CIDR removal using frozen/thawed semen from sires of proven fertility. Ovarian ultrasonographic examinations were performed once a day from d 0 to 7 and twice daily from d 8 to ovulation. Categorical data was compared using chi-square analysis, and quantitative data by ANOVA. A new wave of follicular development was detected on average 3.7±0.9 d after CIDR insertion. Although heifers receiving ECP had a shorter (P=0.02) interval from CIDR removal to ovulation than GnRH heifers (63.8±12.4 and 71.6±10.1 in ECP and GnRH groups, respectively), the pregnancy rate was not different (P=1.0) among groups. A pregnancy rate of 73.3% was obtained after the first synchronization

cycle for ECP, and GnRH treated heifers. An overall pregnancy rate of 93.3% was obtained after two or three synchronization cycles for ECP or GnRH groups, respectively. Ovulation rate (100%) and diameter of ovulatory follicle (13.0±1.8 and 14.0±1.9 mm) did not differ (P>0.05) between ECP, and GnRH groups, respectively. In conclusion, the results from the present experiment demonstrated that ECP administration 24 h after the end of a CIDR treatment resulted in pregnancy rates comparable to the ones obtained after administration of GnRH 48 h after CIDR removal.

Key Words: Estrus synchronization, Dairy heifers, Estradiol cypionate

M15 Effect of estradiol cypionate (ECP) and estradiol benzoate (EB) on synchronization of follicle wave and luteal function in dairy heifers.

K. N. *, R. C. Chebel, A. C. Coscioni, J.E.P. Santos, R.L.A. Cerri, and S. O. Juchem, *University of California - Davis*.

Thirty post-pubertal Holstein heifers (13mo) were randomly assigned to one of four treatments: 1) Control (n=4); 2) 2.0mg of EB (N=6); 3) 1.0 mg of ECP (ECP1; N=10); and 4) 1.5mg of ECP (ECP1.5; N=10). Treatments were given by i.m. injections at 72 h after ovulation. Ovaries were scanned every 12h, and follicles ≥ 4.0mm and CL were tracked from the day before ovulation through the end of the estrous cycle. Blood was collected every 12h from the day of ovulation to 7 d after the treatments for measurements of plasma progesterone and estradiol. Prostaglandin F2a was given on d 17 after ovulation. Continuous data and repeated measurements were analyzed by the GLM and MIXED procedures of SAS (2001), respectively. Treatments were given at similar time after deviation of the dominant follicle (DF) of the first wave (FW1), and averaged 15.7h (P=0.83). Growth rate of the DF of the FW1 was retarded by all estradiol treatments (P<0.001), but EB was more effective than ECP (P<0.001). Hours from ovulation to emergence of FW2 were reduced by EB (178.0 h; P=0.03), but not by ECP1 (212.4 h) or ECP1.5 (218.4 h) compared to controls (234.0 h). Emergence of FW2 after treatment was earlier for EB compared to ECP1 and ECP1.5 (104 vs 140.4 vs 145.2h; P=0.04), and compared to control (162h; P=0.02). Deviation of the DF of the FW2 tended to be earlier for EB compared to control (250 vs 297h; P=0.08), but DF of the FW2 deviated at similar diameter in all four treatments (8.65mm; P=0.68). Relative to emergence of FW2, deviation occurred 67.7h later. Compared to control (17.2mm), both ECP (ECP1=14.9 mm; ECP1.5= 14.1 mm) and EB (11.6mm) reduced the maximum diameter of the DF of the FW1 (P<0.01), but EB was more effective than ECP (P<0.01). Treatment had no effect on the largest diameter of the DF of FW2 and on the diameter of the ovulatory follicle prior to ovulation (P>0.15). Corpus luteum growth after treatment was not altered by estradiol esters (P=0.62). Treatment with EB was more effective than ECP to cause DF turnover and synchronize emergence of a new follicular wave.

Key Words: Estradiol cypionate, Estradiol benzoate, Follicle development

M16 Reproductive management of dairy heifers using synchronization of ovulation and fixed-time artificial insemination (TAI) or artificial insemination after removed tail chalk.

H. Rivera*, H. Lopez, and P.M. Fricke, *University of Wisconsin - Madison*.

Holstein dairy heifers (n=352) between 13 and 14 mo of age were subjected to a 42 d AI breeding period in which heifers received AI after once daily evaluation of removed tail chalk. At AI breeding period onset (Day 0), heifers were randomly assigned to receive synchronization of ovulation and TAI (100 μg GnRH, Day 0; 25 mg $PGF_{2\alpha}$, Day 6; 100 μg GnRH+TAI, Day 8) followed by AI after removed tail chalk for the remainder of the AI breeding period (GPG; n=175), or AI after removed tail chalk for the duration of the AI breeding period (TC; n=177). Interval from AI breeding period onset to first AI service was greater (p<0.01) for TC than for GPG heifers (9.9 ± 0.6 vs. 7.5 ± 0.1 d), whereas conception rate at 30 d post AI was similar between treatments (46.5%, 80/172 vs. 38.3%, 67/175 for TC vs. GPG heifers, respectively). No treatment x AI technician interaction was detected (p=0.70); however, AI technician affected (p<0.01) conception rate (Tech 1=24.8%, 28/113; Tech 2=30.0%, 18/60; Tech 3=58.0%, 101/174). Pregnancy loss from 30 to 75 d post AI was 10.2% (15/147) and was similar between treatments. For GPG heifers, 17.7% (31/175) received AI before day 8 (Day 5.2 ± 0.2) and did not receive TAI. For GPG heifers receiving TAI, 90.9% (131/144) ovulated within 48 h after the second GnRH injection (double ovulation rate=4.9%, 7/144). Blood samples collected from GPG heifers at each injection were classified based on serum progesterone (P) concentrations as High (≥1.0 ng/ml) or Low (<1.0 ng/ml). The proportion of GPG heifers with a functional CL (High P) at $PGF_{2\alpha}$ was 91.6% (132/144), and 96.2% (127/132) of functional CL had regressed (Low P) by 48 h after $PGF_{2\alpha}$. We conclude that this protocol for fixed-time AI of dairy heifers can yield acceptable conception rates if estrus detection and AI is conducted between the first GnRH and $PGF_{2\alpha}$ injections and the effect of AI technician is optimized. *Supported by Hatch project WIS04431 to PMF*

Key Words: Dairy heifers, Synchronization of ovulation, Timed artificial insemination

M17 Effect of a rapid resynchronization of nonpregnant cows with estradiol cypionate (ECP) and PGF2a on pregnancy rates (PR) and pregnancy loss (PL) in lactating dairy cows.

R. C. Chebel*, R.L.A. Cerri, K. N. Galvao, S. O. Juchem, and J.E.P. Santos, *University of California - Davis*.

Nonpregnant Holstein cows inseminated 2 or more times between 28 and 34 d after the pre-enrolment AI were assigned to a rapid resynchronization (Quicksynch; N=159) or to the Heatsynch (N=183) protocol. Cows between 28 and 30 d after AI with a follicle larger than 10mm were assumed to be in first follicular wave of a new estrous cycle and assigned to the Quicksynch protocol, which consisted of injections of 25mg of PGF2a (Pharmacia Animal Health) followed 24h later by 1mg of ECP (Pharmacia Animal Health). Cows were inseminated if observed in estrus or at fixed time 48h after ECP. Cows between 28 to 30 after AI with follicles less than 10mm and cows between 31 and 34 d after AI were enrolled in Heatsynch group and received 100g of GnRH (Merial Ltda), followed 7 d by PGF2a, and ECP 24 h after the PGF2a. Insemination was performed as indicated for the Quicksynch group. Continuous and binomial data were analyzed using the GLM and the LOGISTIC procedures of SAS (2001), respectively. Lactation number, BCS, DIM and milk yield were similar for Quicksynch and Heatsynch cows (P>0.15). The proportion of cows inseminated at fixed time was similar for both protocols (85.0%). Cows in Quicksynch and Heatsynch had similar PR on day 28 (18.9 vs 24.0%; P=0.54) and 42 (17.6 vs 20.8%; P=0.77) after the resynchronized AI. Pregnancy loss between 28 and 42 d after AI was unaffected by treatment (Quicksynch=6.7 vs Heatsynch=14.0%; P=0.41). Cows inseminated during heat stress had lower PR (23.3 vs 11.8%; P=0.03) and higher PL (30.8 vs 6.7%; P=0.02) than those inseminated during the cool season. More Heatsynch than Quicksynch cows had a CL on the day of PGF2a (77.1 vs 62.3%; P<0.001), and presence of a CL increased PR (P<0.001) for both Heatsynch (27.7 vs 11.9%) and Quicksynch (25.3 vs 8.3%). Rapid resynchronization of nonpregnant cows with PGF2a and ECP between 28 and 30 d after the pre-enrollment AI resulted in similar PR and PL compared to the Heatsynch protocol, but PR was improved when a CL was present at the PGF2a injection.

Key Words: Resynchronization, ECP, Dairy cows

M18 Use of intravaginal progesterone-releasing devices (CIDR) to resynchronize postpartum dairy cows previously synchronized for anestrus.

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Introduction: In New Zealand, a fixed breeding season begins about 3 months after calving has begun. At this time, any cow that is greater than 21 days in milk and has not shown a heat is considered to be anestrous **(A)**. These cows may represent up to 20 percent or more of the breeding herd. A animals may be treated with an intravaginal progesterone-releasing device **(CIDR)** to induce cyclicity. Although about 85% of these animals will show estrus and be bred after CIDR removal, only about 40% of these cows will conceive to first AI. Of the remaining cows, almost half (43 percent) will not show estrus 14 to 28 d after first AI. To reduce the problem of these "phantom pregnant" cows, a resynchrony protocol was developed.
Objective: To determine the difference in pregnancy rates **(PR)** at 28 and 56 d post insemination(following an initial CIDR treatment)and the final PR of previously A cows at the end of the breeding period between a no resynchrony group, a resynchrony protocol using a low dose

(0.5mg)of estradiol benzoate **(EB)** only , and a resynchrony group using GnRH and low-dose of EB.

Material and Methods: A cows (n = 971 in 8 herds) were initially treated (7 d prior to the start of the breeding season)with a CIDR for 6 d with injection of 1 mg of EB one day after device removal (day of EB injection = Day 0). Cows detected in estrus between D 0 and 3 were randomly assigned to be treated with a) reinsertion of a used P-releasing device for a period of 8 days on D 15 with 0.5 mg of EB at time of reinsertion and again one day after removal *(EB-low)*, b) as for a) except that 250 mg of GnRH was substituted for EB at CIDR reinsertion *(GnRH-EB-low)* or c) left as untreated controls *(control)*. Cows detected in estrus within 6 wks of commencement of the breeding program were submitted for AI. Bulls were then introduced to the herds for a further 13.5 weeks (stdev = 1.7, range = 11.3-16.9 weeks). Enrolled cows were pregnancy tested twice (with a 6 wk interval) and the conception date estimated.

Results and Conclusions: Fewer cows were pregnant by D 28 and 56 of the breeding program following *GnRH-EB-low* than *EB-low* and *control*, but the final pregnancy rate was higher following *EB-low* than *control* or *GnRH-EB-low* (95.0%, 88.3%, 88.6%, respectively; $p<0.05$). It is concluded that *EB-low* resynchrony enhances reproductive performance of anestrous cows compared to *GnRH-EB-low* resynchrony or no resynchrony under New Zealand conditions.

Key Words: Resynchrony, Intravaginal progesterone releasing device, Cattle

M19 Selective re-synchronization of estrus and timed insemination in lactating dairy cows. J. A. Bartolome*[1], A. Sozzi[1], J. McHale[2], A. Arteche[1], F. Silvestre[1], P. Melendez[1], K. Swift[2], D. Kelbert[2], L. F. Archbald[1], and W. W. Thatcher[1], [1]*University of Florida, Gainesville, Florida, USA,* [2]*NFH Inc., Bell, Florida, USA.*

Objective was to compare pregnancy rate (PR) to re-synchronizations based on uterine and ovarian status. Holstein non-pregnant cows (n=877), were classified at ultrasound on d0 (30d afterAI) as: diestrus (CL, follicle≥12 mm), metestrus (edema, CH, foll.<12 mm), proestrus (tone, foll.≥12 mm), cystic (foll.≥15 mm, no CL, no tone), or anestrus (foll.<12 mm, no tone). Cows in diestrus were assigned to Ovsynch (n=216), Quicksynch ($PGF_{2\alpha}$ [PG] d0, 1 mg ECP d1, and TAI d3; Jan.-May; n=92), or Modified Quicksynch (PG d0, ECP d1, AI at pedometer d2-3, and cows with no activity begin Ovsynch on d4; Jun.-Dec; n=110). Cows in metestrus were assigned to Ovsynch (n=54), Heatsynch (n=50) or GnRH+Ovsynch (GnRH on d0, GnRH d8, PG d15, GnRH d17, and TAI at 16h; n=44). Cows in proestrus assigned to Ovsynch (n=71) or GnRH+Ovsynch (n=73). Cows with ovarian cyst assigned to Ovsynch (n=75) or GnRH+Ovsynch (n=78). Diagnosis (US) for pregnancy was at 30d after TAI. PR was evaluated using multiple logistic regression adjusting for season, parity, number services and inseminator. Cows were classified as: diestrus 47.7% (418/877), metestrus 16.9% (148/877), proestrus 16.4% (144/877), cystic 17.4% (153/877) and anestrus 1.6% (14/877). PRs for diestrus were: Quicksynch 21.7%, Modified Quicksynch 28.2% (32.9% [26/79] at pedometer, 16.0% [5/31] TAI), Ovsynch 34.7%; metestrus: Ovsynch 24.1%, Heatsynch 18%, GnRH+Ovsynch 31.8%; proestrus: Ovsynch 31.0%, GnRH+Ovsynch 27.4%; cystic: Ovsynch 20.0%, GnRH+Ovsynch 30.8%. Ovsynch for cows in diestrus was used as the referent. There were decreases in PR for: Quicksynch cows in diestrus ($P<0.02$); Heatsynch ($P<0.02$) and Ovsynch ($P<0.13$) cows in metestrus; Ovsynch cows with ovarian cysts ($P<0.01$). PR to re-synchronization can be improved by assigning TAI protocols according to uterine and ovarian status. Strategies to increase the number of cows in diestrus at US, reduce treatment time and costs are underway.

Key Words: Re-synchronization, Time insemination, Cattle

M20 Enhancing the efficiency of AI in dairy cattle through modified systematic breeding protocols utilizing heat detection and timed AI. J. C. Dalton[1], R. Manzo*[2], and A. Ahmadzadeh[2], [1]*Caldwell Research and Extension Center, Caldwell, ID,* [2]*University of Idaho, Moscow, ID.*

The objective of this study was to compare the conception rates of lactating dairy cattle subjected to four different artificial insemination (AI) protocols. Two commercial dairies utilizing daily lock up, tail chalk, and once daily AI participated in the study. Cows (N = 432) were administered GnRH (100 ug) on d -7 and received tail chalk daily. Cows detected in estrus according to chalk removal (roughened tailhead hair) prior to d 0 received AI immediately. Cows not detected in estrus by d 0 were administered prostaglandin (PGF; 25 mg) and continued to receive tail chalk daily until d +2. All cows detected in estrus prior to and including d +2 received AI immediately and were considered treatment 1 (T1; n = 46). Cows that were not detected in estrus and not inseminated by d +2 were assigned randomly to one of three treatment groups: GnRH on d +2 and timed AI 16 h later (T2; n = 132), GnRH and timed AI 64 h after PGF (T3; n = 127), or timed AI 64 h after PGF (no GnRH) (T4; n = 127). Pregnancy was diagnosed 38-45 d after AI by rectal palpation. Median days in milk were 112, 120, 128, and 119 for T1, T2, T3, and T4, respectively. Mean milk yield was 39.2, 39.5, 39.0, and 38.2 kg/d for T1, T2, T3, and T4, respectively. Conception rates (adjusted proportion pregnant) were 25.4%, 29.8%, 21.2%, and 16.5% for T1, T2, T3, and T4, respectively. The conception rate (adjusted proportion pregnant) was higher for T1 and T2 compared to T4 (P = .06). The conception rate (adjusted proportion pregnant) was not different between T3 and T4. Nearly 11% of all cattle enrolled exhibited spontaneous estrus, received immediate AI (T1), and achieved an acceptable conception rate. Consequently, dairy producers should consider including heat detection in all systematic breeding programs. Timed AI (without GnRH) 64 h after PGF administration (T4) is not recommended as this treatment resulted in an unacceptably low conception rate (adjusted proportion pregnant).

Key Words: Artificial insemination, Estrus, Conception rate

M21 Reproductive efficiency in cattle selected for ovulation and twinning rate. S. E. Echternkamp* and K. E. Gregory, *USDA, ARS, RLH US Meat Animal Research Center.*

Effect of ovulation rate on cow productivity was evaluated in the MARC Twinner herd by comparing ovulation rate (i.e., CL) at pregnancy diagnosis to calving results and progeny performance. Numbers of fetuses and CL were determined by scanning the uterus and ovaries transrectally with a 3.5 MHz, convex-array, real-time, ultrasound probe at 75 d after first d of the 1995 to 2002 spring and fall breeding seasons; females < 35 d of gestation were re-examined 35 d later. Progeny BW was measured at birth and 200 d of age. Effects of type birth on progeny BW and survival were analyzed by GLM ANOVA with age of dam, sex of calf, dystocia, year, season, and uterine location in the model and on calf survival by Chi-square analysis. Incidence of fetal mortality (abortions) from ultrasound to calving was 6.0% for single, 12.2% for twin, and 50.0% for triplet pregnancies ($P < 0.01$; n = 890, 583, and 28 cows, respectively). Percentage of females calving did not differ ($P > 0.1$) between single ovulations occurring on the left vs right ovary (84.9 vs 82.8%), but twinning rate was greater ($P < 0.01$) for bilateral twin ovulations (61.3% twins and 20.9% singles) compared with unilateral twin ovulations on left (55.4% twins and 27.9% singles) or right (53.6% twins and 27.0% singles) ovary. Calf birth weight and survival were also greater ($P < 0.01$) for bilateral vs unilateral twins (38.5 ± 0.3 kg and 91.8 ± 1.1% vs 36.8 ± 0.3 kg and 82.3 ± 1.1%, respectively). Single-born calves were heavier ($P < 0.01$) than twin or triplet calves at birth (48.7 ± 0.1 vs 37.6 ± 0.1 or 30.5 ± 0.6 kg) and at 200 d of age (256.9 ± 1.4 vs 222.4 ± 1.4 or 210.6 ± 7.0 kg); whereas, number weaned and total 200-d BW per cow calving increased ($P < 0.01$) from single (0.89 ± 0.01 calf and 220.8 ± 2.5 kg) to twin (1.54 ± 0.01 calves and 343.6 ± 3.4 kg) to triplet (1.80 ± 0.08 calves and 378.3 ± 17.8 kg) birth. Bilateral twin ovulations produced the greatest increase in reproductive efficiency in cattle; whereas, increased pre- and postnatal mortality for triplet ovulations and births compromise such gains.

Key Words: Twins, Survival, Cow productivity

M22 CIDR-based protocols for synchronizing bovine embryo transfer recipients without estrus detection. M. G. Colazo[1], J. P. Kastelic*[2], P. R. Whittaker[1], and R. J. Mapletoft[1], [1]*WCVM, University of Saskatchewan,* [2]*Agriculture and Agri-Food Canada, Lethbridge, AB.*

The objective was to compare two protocols to synchronize embryo transfer recipients without detecting estrus. On Day 0 (start of experiment), lactating beef cows (n = 70) were given a CIDR device (Bioniche Animal Health); 36 cows (ECP group) were concurrently given im injections of 1 mg estradiol cypionate (ECP; Pharmacia Animal Health) and 50 mg progesterone (Progesterone 5%; Vtoquinol). On Day 1, the other

34 (GnRH group) were injected im with 100 ug of GnRH (Cystorelin; Merial). On Day 8, CIDR devices were removed, an ultrasonographic examination was done, and cows were given im 500 mg of cloprostenol (Estrumate, Schering Plough). Cows in the ECP or GnRH groups were subsequently administered im 0.5 mg ECP or 100 mg GnRH on Days 9 and 10, respectively. On Day 17, cows with a corpus luteum (CL) > 10 mm in diameter (determined ultrasonically) received a frozen-thawed embryo by nonsurgical, Direct Transfer (utilization rates of 91.6 and 94.1% for cows in the ECP and GnRH groups, respectively). In these two groups, the proportions of cows with two CL were 1/33 and 15/32 (P<0.001) on Day 8 and 6/33 and 3/32 (P<0.3) on Day 17. There was no difference (P<0.5) between the ECP and GnRH groups for CL diameter (22.7 ± 6.3 and 21.7 ± 5.3 mm) or luteal area (302 ± 98 and 296 ± 98 mm2) on Day 17, or for pregnancy rate 68 d after transfer (42.4 and 40.6%). Although cows with two CL on Day 17 had a greater luteal area than those with only one CL (437 ± 70 vs 276 ± 82 mm2, P<0.0001), pregnancy rates were not affected (5/9, 55.5% vs 22/56, 39.2%; P<0.35). However, pregnancy rate was affected by CL diameter (≤ 18 mm, 3/17, 17.6% vs > 18 mm, 24/48, 50.0%; P<0.02) and by the presence of a central luteal cavity on Day 17 (21/43, 48.8% vs 6/22, 27.2%, for cows with and without a cavity; P<0.05). Both treatment protocols resulted in acceptable rates of recipient utilization and pregnancy, but CL diameter and the presence of a central luteal cavity at transfer significantly affected pregnancy rate.

Key Words: Estrus synchronization, Embryo transfer, CL diameter

M23 Effect of a single treatment with estradiol cypionate (ECP) on dominant follicle (DF) and superovulatory response in dairy heifers.

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Effect of a single treatment with estradiol cypionate (ECP) on dominant follicle (DF) and superovulatory response in dairy heifers Thirty-one postpubertal Holstein heifers (13mo) were randomly assigned to one of three treatments: Control (N=10); 1 mg of ECP i.m. on d 3 after ovulation (ECP; N=11); and DF aspiration (ADF; N=10) on d 5 after ovulation (ovulation: study d 0). Superovulatory treatment with FSH (400 mg) started on study d 6, concomitant with insertion of a CIDR. During the 6th and 7th FSH treatment, PGF2a was given and the CIDR removed after the last FSH. An injection of GnRH was given 24 h after CIDR removal and heifers were inseminated twice, 12 h apart, with the first insemination at 12 h after GnRH injection. Heifers were flushed on d 7 after the first AI and structures evaluated. Ultrasonographic examination of the ovaries was performed from study d 0 to 6, and blood samples were collected twice daily from study d 2 to 6 for measurements of progesterone and estradiol. Continuous and count data were analyzed by the GLM and GENMOD procedures of SAS (2001), respectively, and heifer was the experimental unit for analyses. Number of CL on d 7 after AI was higher for ADF than ECP and Control (9.8 vs 5.9 vs 4.3; P<0.01). Number of structures collected was higher for ADF than ECP and Control (8.7 vs 4.7 vs 3.6; P<0.01), but ADF also resulted in higher number of degenerated embryos than ECP and Control (3.1 vs 1.1 vs 1.4; P<0.01). Control heifers had more unfertilized oocytes than ECP (1.5 vs 0.5; P<0.04). Number of grades 1 and 2 embryos was higher for ADF and ECP than control (3.7 vs 2.7 vs 0.6; P<0.01). Percentage of total structures collected as grades 1 and 2 embryos tended to be higher for ECP than control (64.8 vs 30.0%: P=0.10), but it did not differ from ADF (40.7%). Within ECP heifers, those with growth rate of the DF after ECP injection less than 0.9mm/d had higher number of structures collected (7.0 vs 2.0; P<0.01) and more embryos grades 1 and 2 (3.8 vs 1.4; P<0.02) than heifers with DF growing more than 1 mm/d. Treatment with ECP 3 d prior to initiation of superovulation improved number of transferable embryos collected and response was higher when the DF regressed.

Key Words: Estradiol cypionate, Superovulation, Embryo quality

M24 Small follicle numbers in a selected population of Holstein cows: Association with superovulation response.

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The relationship between numbers of small antral follicles and superovulation response in a select population of Holstein cows was examined in this study. Eight daughters of a cow (Integren Secret Sonata-ET) which has consistently responded to superovulation by producing large numbers of embryos (576 total embryos/ova and 400 transferable embryos in 27 collections) and four non-related herd mates were studied. Ovaries of all Sonata daughters in a single herd (n= 32) were observed twice (15 day interval) using ultrasonography to obtain an estimate of the number of small follicles (3-5mm) present. Sonata daughters with greater than 25 3 small follicles/observation were assigned to a high group (n = 4). Sonata daughters that had fewer small follicles (11 2) as compared to the number of small follicles (15 7) present on all of her daughters were assigned to a low group (n = 4). Non-related herd mates (n=4) that were of similar age, stage of lactation, and milk production were assigned as controls. In experiment 1, ovaries of all cows in each group were observed using ultrasonography every twenty-four hours through two consecutive follicular waves. The number of small follicles/day (18 0.4, 13 0.4, and 11 0.4; high, low, and control groups, respectively) differed between the groups (P < 0.0001). In experiment 2, all cows were superovulated three times to obtain a mean superovulation response. Five days following marker heat detection, all follicles >4 mm were ablated. Follicle stimulating hormone (Folltropin) was administered every twelve hours in decreasing doses over four days, beginning 24 hours after follicle ablation. Ova/embryos were collected nonsurgically, seven days after insemination. The number of corpora lutea at embryo recovery (12.3 1.8, 10.6 1.9, 7.4 2.1; high, low, control, respectively), total ova/embryos (7.5 1.7, 9.3 1.8, 3.6 2.0; high, low, control, respectively), transferable embryos (4.6 1.4, 7.5 1.4, 3.1 1.6; high, low, control, respectively), and degenerate embryos (3.0 1.1, 2.3 1.1, 0.6 1.2; high low, control, respectively) recovered did not differ between groups (P>0.05). The number of small antral follicles present on the ovaries of selected sub-populations of Holstein cows was positively associated with the superovulation response.

Key Words: Cattle, Follicle, Superovulation

M25 Adrenal production of cortisol and progesterone in lactating dairy cows with ovarian follicular cysts.

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The adrenal gland may play a causative role in the formation of ovarian follicular cysts in cattle. Two experiments were conducted to determine if adrenal secretion of steroids differed between cows that formed follicular cysts versus normal cycling cows. In experiment 1, lactating Jersey and Holstein cows were diagnosed as having ovarian follicular cysts (follicle diameter ≥ 20 mm) via palpation of ovaries per rectum. Ovaries were examined by transrectal ultrasonography three times weekly to detect ovulations (OV; n=8) and/or new cyst formations (NCF; n=9). Venous blood samples were collected daily to quantify circulating concentrations of cortisol (CORT). The average CORT concentration (μg/dl) across the 10 day period prior to OV was not different from the concentration prior to NCF. In experiment 2, secretion of CORT and progesterone (P4) was examined in cows with ovarian follicular cysts (OFC;n=4) and control cows (CONTROL; n=4) in the follicular phase of the estrous cycle. An adrenocorticotropin hormone (ACTH) challenge (Cortrosyn, 0.06 mg, i.v.) was administered to cows with OFCs. CONTROL cows were treated with prostaglandin $F_{2\alpha}$ (Lutalyse, 25 mg, i.m.) twice, 12 hours apart to induce luteolysis and the onset of the follicular phase. For CONTROL cows, the ACTH challenge was administered 36 hours after the first injection of prostaglandin $F_{2\alpha}$. Jugular venous blood samples were collect at -60, -30, 0, +10, +20, +30, +60, +90, +120, +180, +240, +300 and +360 minutes relative to ACTH administration. A rapid increase in both CORT and P4 was observed immediately following administration of ACTH in each treatment group (OFC and CONTROL). Peak concentrations of both steroids were achieved 30 minutes post ACTH administration. Mean concentrations of CORT and P4 did not differ between treatment groups (OFC vs. CONTROL) with respect to response and/or area under the curve. In summary, no differences in adrenal function were detected between normal cycling cows and cows with ovarian follicular cysts.

Key Words: Progesterone, Cortisol, Ovarian follicular cyst

M26 Effects of immunization of gilts against 17α-hydroxyprogesterone on follicular size distributions and follicular steroid synthesis. N. Post*[1], D. Kreider[1], K. Cole[1], M. Nihsen[1], and C. Maxwell, [1]*University of Arkansas.*

The objective of this experiment was to evaluate the effects of immunization of gilts against 17α-hydroxyprogesterone on follicular size distributions and follicular steroid synthesis. Thirty-six crossbred gilts at 147 d of age were immunized against adjuvant (Control, n = 18) or 17α-hydroxyprogesterone (17OHP, n = 18). Gilts were given an initial 0.6 ml injection divided between two subcutaneous sites at the base of each ear, followed four weeks later by a single booster injection. Estrus was checked twice daily with a boar. At 16 to 17 d following first estrus gilts were sacrificed, tracts were recovered and uterine weight, uterine length, number of corpora lutea, and number of small (0-3 mm), medium (4-6 mm), and large (> 7 mm) follicles was determined. Serum binding of 17α-hydroxyprogesterone in 17OHP was greater than (P < 0.01) Control and increased with time (P < 0.01). Age at puberty was not affected by treatment (P = 0.28) and averaged 187.1 ± 0.4 and 183.9 ± 1.7 d for Control and 17OHP, respectively. Serum progesterone during the first 17 d of the estrous cycle was higher for 17OHP than Control (P = 0.09). Serum estradiol-17β was not affected by treatment (P = 0.84). Serum progesterone (P < 0.01) and estradiol-17β (P < 0.01) were affected by time. Uterine weight was increased (P = 0.12) in 17OHP vs. Control, while mean uterine length was numerically greater (P = 0.18) in 17OHP vs. Control (716.8 ± 47.8 vs. 625.3 ± 30.1 g and 214.8 ± 10.7 vs. 211.1 ± 11.2 cm., respectively). Ovulation rate at first estrus was higher in 17OHP than Control (15.8 ± 0.6 vs. 13.4 ± 0.4). Follicular fluid estradiol-17β did not differ between treatments (P > 0.62) for any follicular size class; however, testosterone was higher (P = 0.16) in medium follicles of 17OHP than Controls (133.1 ± 22.5 vs. 94.5 ± 13.6 ng/ml, respectively). These data suggest that immunization against 17OHP altered follicular growth and steroid synthesis.

Key Words: Gilts, Ovulation rate, Steroids

M27 A direct injection of vascular endothelial growth factor (VEGF) gene to the ovary promotes follicular development in miniature gilts. T. Shimizu, H. Sasada, and E. Sato*, *Tohoku University, Sendai, Japan.*

Ovarian follicular angiogenesis initiates early during follicular development and continues throughout follicular growth. In general, vascular endothelial growth factor (VEGF) is thought to be a central factor for regulation of thecal angiogenesis during follicular development. We investigated whether follicular development was promoted by inducing extraproduction of VEGF with direct ovarian injection of its gene in miniature gilts. Using a TAP Express KitTM, porcine VEGF gene was transformed into a transcriptionally active PCR fragment that is used for direct introduction into mammalian tissues according to the manufacture's instrument. Eleven prepubertal miniature pigs were used and divided in three groups. The first group was injected i.m. with 500 IU of eCG to induce follicular development, and the second was injected with saline as a control. The third group was directly injected with VEGF gene fragments into both ovaries, followed by administration i.m. with 500 IU of eCG 7 days later. Animals from each group were ovariectomized 72 h after eCG or saline injection. The number of the preovulatory follicles increased in the VEGF-treated ovaries compared to those of either the control or the eCG alone. No atretic follicle with larger than 3.0 mm was observed in the ovaries treated with VEGF gene injection. In the ovaries injected with VEGF gene, the vascular density in medium follicles ranged between 3.0 and 4.9 mm in diameter increased approximately two folds compared to those of the eCG alone. The follicles with larger than 6.0 mm in diameter, which were appeared only in the gilts received the injection of VEGF gene, had significantly higher vascular density than those of other follicles. Our findings demonstrated that the direct injection of VEGF gene into the ovary induces the development of the vascular network in the thecal cell layers and can promote follicular development by reflection on rescue of the atretic follicles.

Key Words: Thecal angiogenesis, Follicular development, Atretic follicle

M28 Effects of the ovulatory response to the first GnRH injection on synchronization and pregnancy rates in lactating dairy cows. RM Santos*[1], JLM Vasconcelos[2], M Meneghetti[2], EPBC Silva[2], and FS Wechsler, [1]*FCAV - Unesp, Jaboticabal,* [2]*FMVZ - Unesp, Botucatu.*

Data from 2 trials were analyzed to evaluate the effect of ovulation to the first GnRH treatment in synchronization of ovulation protocols in lactating dairy cows. In trial 1, 136 lactating Holstein cows, with 23.7±5.8 kg milk/d and 138.4±72 DIM, were randomly assigned to one of 2 groups that differed in the dosage of GnRH: G1 (N=68), Ovsynch with 1.0 mg of gonadorelin (Fertagyl®, i.m.); and G2 (N=68), Ovsynch with 2.5 mg de gonadorelin. In trial 2, 204 crossbred lactating cows, with 13.8±4.0 kg milk/d and 99.8±73.6 DIM, were randomly assigned to one of 2 groups: G1 (N=102), GnRH+CIDR in-6d-PGF2α+CIDR out-48h-GnRH-12h-AI; and G2 (N=102), GnRH+CIDR in-6d-PGF2α+CIDR out-24h-ECP-36h-AI. Data were analyzed by the CATMOD procedure of SAS with a mathematical model that included the effects of breed, ciclicity, milk production, parity and treatment. No effects of treatments were detected on trial 1. However, in trial 2 treatment influenced synchronization rate (P<.10), but not pregnancy rate. Ovulatory response to the first GnRH injection averaged 55

Key Words: Synchronization, GnRH, Dairy cow

M29 Effects of nutrition and progesterone therapy on ovulation, embryonic survival, and pregnancy rates in ewes. B. R. Faris*, J. E. Otero, T. T. Ross, A. S. Carmen, R. W. Montgomery, L. A. Terrazas, and D. M. Hallford, *New Mexico State University, Las Cruces, NM/USA.*

This study was conducted to determine the effect of pre- and post-ovulatory nutrition with or without supplemental progesterone (P_4) on ovulation, embryonic survival, and pregnancy rates in multiparous ewes. Multiparous ewes (n=66) were randomly assigned to a 3 x 2 factorial and fed individually. Groups 1 and 2 received a diet 2 x maintenance 2 wk prior to mating (d 0), and 2 x and 1 x maintenance, respectively, up to d 15 post mating with half of each group receiving P_4 supplementation via a controlled internal drug releasing device (CIDR) starting 24 h post estrus (d 2). Group 3 received a diet 1 x maintenance 2 wk prior to and during breeding season with and without P_4 supplementation via a CIDR starting 24 h after estrus. After d 15 post mating, all diets were 1 x maintenance. Ewes were bred via natural service after estrus was detected using a vasectomized ram and the HeatWatch® system. Progesterone therapy continued until d 23 after mating. Ovulation rate was determined (mid-ventral laparotomy) using five randomly selected ewes from each treatment ranging from d 4 to d 8 post breeding. Blood samples were collected (jugular venipuncture) from these 30 ewes every third day from d 2 to 29 at 1800 h. Plasma insulin and P_4 concentrations were determined by RIA. Insulin was not affected (P > 0.20) by P_4 treatment. Group 1 had a greater (P < 0.03) insulin concentration than 2 and 3. Progesterone was elevated (P < 0.01) for ewes receiving CIDR starting 12 h after insertion through d 11. Ewes in nutritional groups 1, 2, and 3 differed (P < 0.05) in P_4 concentration (0.9, 1.6, and 2.4 ng/ml, respectively). Number of corpora lutea present was similar (P > 0.50) across CIDR and nutritional treatments. Additionally, no difference (P > 0.30) was observed across nutritional treatments for ewes ultrasounded as having zero, single, or twin lambs. However, ultrasound data indicated ewes receiving CIDR had a higher incidence of singles and lower twinning rates (P = 0.01). This was verified by ultrasound data from all ewes on the project for P_4 therapy (P = 0.05). In summary, P_4 therapy decreased the number of ewes with multiple fetuses. Nutrition did not influence ovulation rate or pregnancy rate.

Key Words: progesterone, ovulation, embryonic survival, pregnancy rate, insulin

M30 Effects of feeding supplemental safflower seed with human chorionic gonadotropin following AI on pregnancy rates in heifers. R. S. Walker*[1], P. D. Burns[2], G. E. Sides[3], and D. D. Zalesky[1], [1]*San Juan Basin Research Center, Hesperus, CO, USA,* [2]*Colorado State University, Fort Collins, CO, USA,* [3]*Intervet, Inc., Millsboro, DE, USA.*

The objective of this study was to determine the effects of supplementing 0.96 kg of whole safflower seed with an hCG injection post AI to

increase fertility in heifers. Primiparous crossbred beef heifers (n = 96) were divided into two breeding seasons, early breeding heifers (EBH, n = 48) and late breeding heifers (LBH, n = 48), and randomly assigned to one of two dietary supplement groups by weight and age for both EBH and LBH. Heifers were fed a control diet (CON) consisting of mixed alfalfa/grass hay and oat grain or a safflower seed diet (SAFF) consisting of the control diet plus safflower seed high in oleic (69.9 %) acid. Diets were fed 35 d prior to AI and continued 20 d post AI. Diets were formulated to be isocaloric and isonitrogenous for both groups. Heifers in each supplement group for both EBH and LBH received either an injection of hCG (3,300 IU) or saline 5 d post AI. All heifers were synchronized using 7-11 MGA Select Synch. Heifers were bred AI 12 h after the onset of estrus. Jugular samples were collected three different times prior to AI to determine changes in plasma fatty acid profiles. Body condition score, reproductive tract score, and weight did not differ ($P > 0.05$) between supplement groups for EBH and LBH, therefore, EBH and LBH were pooled together. There were no differences ($P > 0.05$) in conception rates for each supplement group or for hCG injected heifers ($P > 0.05$). More hCG injected heifers in both treatments conceived to AI (66.7 vs 59.5 %), but did not differ from saline treated heifers ($P > 0.05$). Plasma stearic acid increased ($P < 0.01$), while plasma linolenic acid decreased ($P < 0.01$) in both supplement groups. Plasma oleic acid increased for the SAFF group ($P < 0.01$) verses the CON group. Feeding 0.96 kg of whole safflower seed 35 d prior to AI did not improve fertility, yet conception rates appeared to increase when hCG was given 5 d post AI.

Key Words: Beef hiefers, Safflower, hCG

M31 Effect of exogenous progesterone before calf removal and prostaglandin $F_2\alpha$ on estrous response and pregnancy rates in 3-year-old beef cows. J. L. Olson*[1], A. J. Roberts[2], J. A. Paterson[1], and R. N. Funston[3], [1]*Montana State University, Bozeman,* [2]*USDA-ARS, Miles City, Mt,* [3]*University of Nebraska, Lincoln.*

Objectives for this experiment were to determine effects of a 7 d pretreatment with an intravaginal progesterone insert (CIDR) on estrous response and pregnancy rates in 3-year old postpartum beef cows synchronized with calf removal and prostaglandin $F_2\alpha$. Cows (BW = 488 ± 7.4; body condition score = 3.8 ± .07; days postpartum = 58.7 ± 1.2) were randomly allotted to either control (n=22; i.m. injection of 25 mg $PGF_2\alpha$ [Lutalyse®] on d 0) or CIDR treatment from -7 to 0 d preceding, $PGF_2\alpha$ injection on d 0 (CIDR; n=18). All calves were weaned on d 0. Cows were observed for estrus for 120 h after $PGF_2\alpha$ and inseminated by AI approximately 12 h after the onset of estrus. A bull was placed with cows 12 d after $PGF_2\alpha$ and removed 40 d after $PGF_2\alpha$. Circulating progesterone (P4) concentrations were determined in blood samples collected on d -7, 0, and 11. Pregnancy status was diagnosed by ultrasonography on d 54 and 145 after $PGF_2\alpha$. Synchronization rates were higher ($P < 0.05$) for CIDR (100%) compared to Control (77%) cows. Time of estrus did not differ ($P > 0.10$) between Control and CIDR cows (2.41 ± .15 d). Pregnancy rates by AI were not different ($P = .28$), between Control (18%) and CIDR (33%) cows. Overall pregnancy rates were higher ($P < 0.10$) in Control (97%) compared to CIDR (80%) cows. Concentrations of P4 on d -7, d 0, and d 11 did not influence ($P > 0.10$) overall pregnancy rates; however, progesterone concentrations were increased ($P < 0.05$) in CIDR cows on d 0 (5.6 vs. 2.9 ng/ml, for CIDR vs. Control) and d 11 (7.1 vs. 4.8 ng/ml, for CIDR vs. Control). Administration of a CIDR 7 d before calf removal and $PGF_2\alpha$ increased concentrations of P4 on d 0 and 11, and increased the proportion of cows exhibiting estrus. However, CIDR treatment did not improve conception and AI pregnancy rates and reduced overall pregnancy rates in this study.

Key Words: Postpartum, Beef cows, CIDR

M32 Effects of glucose concentration and presence of EGF and hormones on bovine oocyte maturation. D. J. Walker*, J. F. De La Torre-Sanchez, and G. E. Seidel, Jr., *Colorado State University Fort Collins, CO 80523.*

The purpose of this study was to examine effects of glucose concentration, epidermal growth factor (EGF), and hormones (FSH, LH, and estradiol 17 β) during bovine oocyte maturation on in vitro production of blastocysts. Oocytes from slaughterhouse ovaries were divided among the 12 factorial combinations of 3 glucose concentrations (0.5, 2.0, and 5.5 mM), presence or absence of 50 ng/ml of EGF, and presence or absence of LH, FSH, and E_2 in CDM-1, a chemically defined medium similar to SOF. Oocytes were matured at 38.5C in 5% CO_2 in air for 23 1 h. After maturation, oocytes were fertilized at 1 X 10^6 sperm/ml in 6 replicates in F-CDM (0.5 mM glucose), and then cultured 2 days in CDM-1 (0.5 mM glucose) and 4 days in CDM-2 (2 mM glucose). Glucose concentration in maturation medium at 0.5, 2.0, and 5.5 mM had no effect on blastocyst rates per oocyte, 33%, 32%, and 31% respectively. However, 0.5 mM glucose resulted in a cleavage rate of 87%, higher than 81% seen for both 2 and 5.5 mM glucose (P=.004). EGF and hormones independently enhanced cumulus expansion, but there was no synergism between them, and they had no affect on cleavage or blastocyst rates. Both cleavage (P=.0003) and blastocyst rates (P=.02) were affected by which of 3 bulls was used for fertilization.

Key Words: Bovine, Embryo, Oocyte

Triennial Reproduction Symposium

M33 Post-thaw fertility of bovine semen aged within an AI straw for 8.5 hours. J. L. Edwards*[1], M. N. Malone[1], F. N. Schrick[1], H. H. Dowlen[2], H. D. Moorehead[2], P. A. Lunn[2], and A. M. Saxton[1], [1]*The University of Tennessee, Knoxville,* [2]*Dairy Experiment Station, Lewisburg, TN, USA.*

Objective was to evaluate fertility of frozen-thawed semen aged for 8.5 h. Estrus was visually assessed three times daily for at least 30 minutes each time. Jersey heifers (age: 13.9 ± 1.4 mo; weight: 272.8 ± 19.2 kg) observed standing to be mounted between 0700 and 1200 h were randomly assigned to be inseminated with a straw of frozen semen that had been thawed and maintained in a Cito Thaw Unit (34.4°C water bath) for 8.5 ± 0.04 min (Control; range 3-14 min) or 8.5 ± 0.68 h (Aged; range 6-10 h). Heifers observed in estrus after 1200 h were inseminated with control semen. All heifers were inseminated according to AM/PM rule. To age sperm, a straw of frozen semen was thawed immediately after visual detection of a heifer in estrus and then maintained in a Cito Thaw unit until insemination approximately 8.5 h later. Frozen semen was purchased from various AI organizations (n=6). Individual Jersey bulls (n=30) were randomly and evenly distributed across treatments. Establishment of pregnancy was determined by palpation per rectum at 45 to 65 d post-insemination. Animals were monitored throughout pregnancy and upon calving, sex of offspring was recorded. Data were analyzed using Chi-Square; variables of interest included proportion pregnant, calving, and sex of resulting offspring. Effects of inseminating Jersey heifers with sperm aged within an AI straw for 8.5 h post-thaw were minimal. Fifty percent of heifers inseminated with aged semen became pregnant and delivered a live calf at term (Table). Proportion of female offspring was similar. Ability to maintain frozen-thawed semen within an AI straw for 8.5 h in a 34.4°C water bath without significant reductions in fertility demonstrates that sperm can be held post-thaw for extended time periods and suggests potential for manipulation post-thaw for sexing or performing diagnostics.

Treatment	No. Bred	Pregnant (%)	Calved (%)	Female (%)
Control	59	37(62.7)	37(62.7)	19(51.4)
Aged	56	28(50.0)	28(50.0)	11(39.3)
P-value		0.19	0.19	0.45

Key Words: Frozen semen, Aging, Artificial insemination

M34 Effects of presynchronization and/or post-breeding treatment with porcine LH or hCG on pregnancy rates in dairy cows. J. P. Kastelic*[1] and J. D. Ambrose[2], [1]*Agriculture and Agri-Food Canada, Lethbridge, AB, Canada,* [2]*Alberta Agriculture Food and Rural Development, Edmonton, AB, Canada.*

The objectives were to determine the effects of presynchronization with a prostaglandin F2α analogue and/or post-breeding treatment with porcine LH (pLH) or hCG on pregnancy rates in dairy cows. In three experiments, an Ovsynch protocol was used to synchronize ovulation in