842 Comparison of long-term progestin-based protocols to synchronize estrus in postpartum beef cows. J. M. Nash*, D. A. Mallory, C. C. Selby, K. G. Pohler, M. R. Ellersieck, M. F. Smith, and D. J. Patterson, *University of Missouri*, *Columbia*.

The objective of the experiment was to compare follicular dynamics, ovulatory response to GnRH, steroid hormone concentration patterns, and synchrony of estrus and ovulation among estrous-cycling and anestrous postpartum beef cows following treatment with long-term progestin-based protocols. Beef cows (n = 40) were assigned to treatments based on age, days postpartum, BCS and estrous cyclicity status. Blood samples were taken 10 and 1 d before treatment to determine estrous cyclicity status (progesterone ≥0.5 ng/mL estrous cycling). CIDR Select (T1, n = 20) treated cows received a controlled internal drug-release insert (CIDR;1.38 g progesterone) from d 0 to 14 followed by GnRH (100 μg, i.m.) on d 23, and PG (25 mg, i.m.) on d 30. Cows assigned to the 14-d CIDR-PG (Show-Me-Synch T2, n = 20) treatment received a CIDR insert from d 0 to 14 and PG on d 30. Ultrasound was used to determine response to GnRH for T1 treated cows or follicle turnover for T2 treated cows coincident with timing of GnRH for T1; follicle size at AI; and pregnancy diagnoses. T1 treated cows had a higher ovulatory response to GnRH than cows in T2 ($P < 0.001$; T1 = 17/20, 85% ovulatory response; T2 = 1/20, 5% follicle turnover); however, progesterone at PG did not differ between treatments ($P = 0.17$). Mean diameter of the dominant follicle at GnRH, PG and AI did not differ between treatments ($P > 0.05$). Estrous response, determined from Heatwatch, during the 2 synchronized periods, following CIDR removal and after PG, did not differ ($P = 1.0$) between treatments. Variances for interval to estrus after CIDR removal and PG were similar for both treatment groups ($P > 0.05$). Synchronized AI conception rates did not differ between T1 and T2 treated cows ($P > 0.05$; 72% vs. 58%, respectively); and there was no difference in synchronized AI pregnancy rates between treatments ($P > 0.05$; T1 = 68%; T2 = 55%). In summary, CIDR Select and Show-Me-Synch protocols were equally effective at synchronizing estrus in postpartum beef cows.

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Key Words: AI, beef cow, CIDR insert

843 Comparison of long-term progestin-based protocols to synchronize estrus prior to fixed-time AI in beef heifers. D. A. Mallory*, J. M. Nash, M. R. Ellersieck, M. F. Smith, and D. J. Patterson, *University of Missouri*, *Columbia*.

This experiment was conducted to compare pregnancy rates resulting from fixed-time AI (FTAI) after administration of either one of 2 long-term controlled internal drug release (CIDR)-based protocols. Heifers from a single location were assigned to treatments by age, BW, and reproductive tract score (RTS; 1 = immature to 5 = estrous cycling). Heifers assigned to the CIDR Select treatment protocol (n = 192) received a CIDR insert (1.38 g progesterone) from d 0 to 14, followed by GnRH (100 μg, i.m.; Cystorelin) 9 d after CIDR removal (d 23) and prostaglandin $F_{2\alpha}$ (PG; 25 mg, i.m.; Lutalyse) 7 d after GnRH (d 30). Heifers assigned to the 14-d CIDR-PG treatment protocol (Show-Me-Synch; n = 200) received a CIDR insert from d 0 to 14 followed by PG 16 d later (d 30). Artificial insemination was performed at predetermined fixed times for heifers in both treatments at 72 or 66 h after PG for the CIDR Select and Show-Me-Synch groups, respectively. All heifers were administered GnRH (100 μg, i.m.) at the time of AI. Heifers were exposed for a 42 d natural service clean-up period beginning 10 d after FTAI. There were no differences between treatments for age ($P = 0.74$), BW ($P = 0.92$), or RTS ($P = 0.67$). FTAI pregnancy rates tended ($P = 0.07$) to be greater among Show-Me-Synch (124/200; 62%) compared with CIDR Select (98/192; 51%) treated heifers. Final pregnancy rates did not differ ($P = 0.72$; CIDR Select, 85%; Show-Me-Synch, 83%) between treatments. Based on the odds ratio, Show-Me-Synch treated heifers were 1.62 times more likely to conceive to FTAI than heifers synchronized with CIDR Select. Pretreatment estrous cyclicity status did not affect ($P = 0.32$) FTAI pregnancy rate; however, estrous cycling heifers assigned to Show-Me-Synch had a tendency to have higher FTAI pregnancy rates (63%) than those assigned to CIDR Select (53%; $P = 0.06$). In summary, both long-term progestin based protocols were effective in synchronizing estrus before fixed-time AI in beef heifers.

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Key Words: AI, beef heifer, CIDR

844 Comparison of long- versus short-term progestin-based protocols to synchronize estrus and ovulation prior to fixed-time AI in postpartum beef cows. D. A. Mallory*, J. M. Nash, M. R. Ellersieck, M. F. Smith, and D. J. Patterson, *University of Missouri*, *Columbia*.

This experiment was designed to compare pregnancy rates in postpartum beef cows resulting from fixed-time AI (FTAI) after treatment with long- versus short-term controlled internal drug release (CIDR)-based protocols to synchronize estrus and ovulation. Angus cows were assigned to treatments by age, BCS, and days postpartum (DPP). Cows assigned to the long-term 14-d CIDR-PG (Show-Me-Synch; n = 99) treatment protocol were administered CIDR inserts (1.38 g of progesterone) from d 0 through 14. Prostaglandin $F_{2\alpha}$ (PG, 25 mg, i.m.) was administered 16 d after CIDR removal, on d 30 of treatment. Cows assigned to the short-term treatment protocol (7-d CO-Synch + CIDR; n = 104), received GnRH (100 μg, i.m.) and CIDR inserts on d 0. CIDR inserts were removed 7 d later at the time PG was administered (d 7). Blood samples were collected on d −9 and immediately before treatment initiation to determine pretreatment estrous cyclicity status of cows (progesterone ≥0.5 ng/mL; Show-Me-Synch, 54/99 = 55%; 7-d CO-Synch + CIDR 51/104 = 49%; $P = 0.52$). Continuous estrus detection was performed using HeatWatch; transmitters were fitted at PG and removed at AI. AI was performed at predetermined fixed times (72 h, Show-Me-Synch; 66 h, 7-d CO-Synch + CIDR) and all cows were administered GnRH (100 μg, i.m.) at AI. There were no differences ($P > 0.10$) between treatments for age, BCS, or DPP. Pregnancy rates were greater ($P < 0.01$) among cows that exhibited estrus before FTAI than for those that did not (52/73 = 71% and 55/130 = 42%, respectively). Pregnancy rates resulting from FTAI did not differ between treatments ($P > 0.10$); technicians ($P > 0.10$); AI sires ($P > 0.10$); or on the basis of pretreatment estrous cyclicity status ($P > 0.10$). Final pregnancy rates did not differ between treatments ($P = 0.53$). In summary, pregnancy rates resulting from FTAI following treatment with Show-Me-Synch and 7-d CO-Synch + CIDR were similar among postpartum beef cows.

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Key Words: AI, beef cow, CIDR

845 Effect of $PGF_{2\alpha}$ administration at CIDR insertion on AI pregnancy rates in beef heifers. B. L. Sparks*[1], S. L. Lake[2], J. Berry[2], K. Heaton[3], R. P. Lemenager[1], L. A. Horstman[1], K. S. Fisher[1], P. J. Gunn[1], and G. A. Bridges[1], [1]*Purdue University*, *West Lafayette, IN,* [2]*University of Wyoming*, *Laramie,* [3]*Utah State University*, *Logan*.

The objective of this study was to compare 3 estrous synchronization protocols in beef heifers. Heifers managed at 5 locations were assigned to the 7 d Select Synch + CIDR & timed-AI (TAI; 7dSS; n = 298), 5 d Select Synch + CIDR & TAI (5dSS; n = 366), or an experimental 7 d protocol where $PGF_{2\alpha}$ (PGF) was given at CIDR insertion (7dMOD; n = 373). On d −7, the 7dSS treatment received a CIDR and GnRH (100 μg), while the 7dMOD treatment received a CIDR and PGF (25 mg). On d −5, the 7dMOD treatment received GnRH and the 5dSS treatment received a CIDR and GnRH. On d 0, CIDR were removed and all heifers received 2 25 mg doses of PGF given 8 h apart. Estrus was detected twice daily for 60 h after CIDR removal and heifers detected in estrus were AI by the AM/PM rule. At 72 h after CIDR removal heifers not detected in estrus were TAI and received GnRH. Bulls were placed with the heifers 7 d after TAI for the remainder of the breeding season. Pregnancy was diagnosed approximately 35 d after TAI and bull removal, respectively. The effect of treatment, location, and the interaction on estrous response, interval to estrus, conception rate, TAI conception rate, overall AI and breeding season pregnancy rate were analyzed using SAS. The treatment by location interaction was not significant for any variable, thus data were pooled. Estrus response was greater ($P < 0.05$) in the 7dSS (67.1%) and 7dMOD (69.4%) treatments than the 5dSS (56.0%) treatment. Interval to estrus was shorter ($P < 0.01$) in the 7dSS (46.7 ± 0.5 h) and 7dMOD (47.7 ± 0.7 h) treatments compared with the 5dSS (51.9 ± 0.5 h) treatment. Conception rate of heifers in estrus was greater ($P < 0.05$) in the 5dSS (61.9%) and 7dMOD (66.4%) treatments than the 7dSS (50.0%) treatment. Conception rate to TAI did not differ between treatments (45.8%). More ($P < 0.05$) heifers became pregnant to AI in the 5dSS (57.1%) and 7dMOD (58.7%) treatments than the 7dSS (47.3%) treatment. Breeding season pregnancy rates were similar between treatments (86.4%). In conclusion, the 5dSS and 7dMod protocols yielded greater AI pregnancy rates in beef heifers than the 7dSS protocol.

Key Words: beef, estrous synchronization, heifer

846 Influence of inducing luteal regression prior to a fixed-time AI CIDR protocol in postpartum beef cows on pregnancy success. G. A. Perry*, B. L. Perry, and J. H. Krantz, *Department of Animal & Range Sciences*, *Brookings, SD*.

Most fixed-time insemination protocols utilize an injection of GnRH at the beginning of the protocol to initiate a new follicular wave. However, the ability of GnRH to initiate a new follicular wave is dependent on the stage of the estrous cycle. We hypothesized that administering $PGF_{2\alpha}$ 3 d before initiating a fixed-time AI protocol would improve synchrony of follicular waves and result in greater pregnancy success. Therefore, our objective was to determine whether inducing luteal regression 3 d before a fixed-time AI protocol would improve pregnancy rates. Multiparous crossbred cows at 2 farms (n = 296 and n = 97) were randomly assigned to one of 2 treatments: 1) $PGF_{2\alpha}$ (25mg; i.m.) on d −9, GnRH (100μg; i.m.) and insertion of a CIDR on d −6, $PGF_{2\alpha}$ (25mg; i.m.) and CIDR removal on d 0 (PG-CIDR) or 2) GnRH (100μg; i.m.) and insertion of a CIDR on d −5 and CIDR removal with $PGF_{2\alpha}$ (25mg; i.m.) at CIDR removal and 4 to 6 h after CIDR removal (5d CIDR). Cows were time-inseminated between 66 and 72 h (PG-CIDR) or 70 to 74 h (5d CIDR) after CIDR removal. Pregnancy rates to fixed-time AI were determined by ultrasonography 76 to 82 d after AI in herd 1 and 35 d after AI in herd 2. In herd 1, PG-CIDR cows were longer postpartum ($P < 0.01$; 71 ± 1.2 d) than 5d CIDR cows (65 ± 1.1 d). In herd 2, there was no difference ($P = 0.58$; 79 ± 2.0 and 81 ± 2.0 d for PG-CIDR and 5d CIDR, respectively). There were no differences between treatments ($P = 0.07$), locations ($P = 0.35$), or treatment by location ($P = 0.19$) on BCS. Pregnancy rates were 59% (89/149) and 46% (68/147) for PG-CIDR and 5d CIDR in herd 1, respectively ($P = 0.02$); and 77% (37/48) and 67% (33/49) for PG-CIDR and 5d CIDR in herd 2, respectively ($P = 0.28$). When data from both herds were combined pregnancy rates remained different between protocols [$P = 0.01$; PG-CIDR = 126/197 (64%); 5d CIDR = 101/196 (52%)]. In summary, pregnancy rates resulting from fixed-time AI were improved by inducing luteal regression 3 d before initiation of a fixed-time AI protocol.

Key Words: estrous synchronization, fixed-time AI, beef cows

847 Influence of luteal regression prior to GnRH on LH pulse frequency and synchrony of follicular growth. J. K. Grant*[1], F. M. Abreu[2], and G. A. Perry[1], [1]*Department of Animal & Range Sciences*, *Brookings, SD,* [2]*USDA-ARS Ft. Keogh*, *Miles City, MT*.

Research has reported that luteal regression before a GnRH injection decreased progesterone concentrations and increased synchrony of follicular growth and estrus. The objective of this study was to determine the effects of luteal regression before a GnRH injection on LH pulse frequency and synchrony of follicular growth. Angus-cross beef heifers (n = 15) were assigned to one of 3 treatments: 1) $PGF_{2\alpha}$ on d −9, GnRH and insertion of a CIDR on d −6, and $PGF_{2\alpha}$ and CIDR removal on d 0 (PG-CIDR), 2) $PGF_{2\alpha}$ on d −9, GnRH on d −6, and $PGF_{2\alpha}$ on d 0 (PG-No CIDR), or 3) GnRH and insertion of a CIDR on d −7 and $PGF_{2\alpha}$ and CIDR removal on d 0 (7d CIDR). Follicular growth was determined daily by transrectal ultrasonography. Blood samples were collected daily for determination of progesterone concentrations. On d 4 after CIDR insertion (d −3 for 7d CIDR and d −2 for PG-CIDR and PG-No CIDR), blood samples were collected every 15 min for 8 h to determine LH pulse frequency. There was a treatment ($P = 0.04$), time ($P < 0.01$), and treatment x time ($P < 0.01$) interaction on progesterone concentrations. PG-No CIDR had decreased concentrations compared with PG-CIDR and 7d CIDR, which were similar. There was a tendency ($P = 0.09$) for LH pulse frequency to be greater among PG-CIDR (3.4 ± 0.24) and PG-No CIDR (3.4 ± 0.24) compared with the 7d CIDR (2.6 ± 0.40), but area under the curve ($P > 0.76$) and mean LH concentrations ($P > 0.76$) did not differ. Follicular growth rates did not differ between treatments ($P > 0.14$), but there was a tendency for decreased variance in growth rate among PG-CIDR (0.03) compared with PG-No CIDR ($P = 0.1$; 0.10) and 7d CIDR ($P = 0.06$; 0.20). In addition, variance in dominant follicle size on d 0 was decreased in PG-CIDR (0.2) compared with PG-No CIDR ($P < 0.01$; 7.8) and 7d CIDR ($P = 0.01$; 5.1). In summary, luteal regression before a GnRH injection tended to increase LH pulse frequency and decrease variation in follicle growth and decreased variation in follicle size on d 0.

Key Words: LH, estrous synchronization, follicular growth

848 The influence of two doses of PGF2α given at 2 or 12 hour intervals on luteolysis and pregnancy rate to timed AI with the 5-d CO-Synch + CIDR program. L. H. Cruppe*[1], M. Maquivar[1], E. M. Jinks[1], G. E. Fogle[1], M. L. Mussard[1], A. V. Pires[2], and M. L. Day[1], [1]*The Ohio State University*, *Columbus*, [2]*University of São Paulo*, *Piracicaba, SP, Brazil*.

The objectives of these experiments were to assess the impact of the interval between 2 PGF2α doses in the 5-d CO-Synch + CIDR on

reproductive performance (Expt 1) and luteal regression (Expt 2) in beef cows. Cows were assigned, within parity, by days postpartum to treatments. Blood samples for progesterone (P4) analysis were collected on d −15 and −5 to classify cows as cyclic or anestrus. All cows received 100 µg of GnRH (Cystorelin) at the time of CIDR insertion on d −5. In Expt 1, all cows (n = 254) received their first 25 mg dose of PGF i.m. (Lutalyse) on d 0 (h 0) and at the time of CIDR withdrawal and tail paint application. A second dose of PGF was given at either h 2 (2hPGF) or h 12 (12hPGF). At h 72, cows received 100 µg GnRH and timed-AI (TAI). Blood samples were collected on d 3 (h 72), 10 and 15 and analyzed for P4, and h 72 samples from cows that were not detected in estrus were analyzed for estradiol (E2) concentration. In Expt 2, cows (n = 31) received the 2hPGF and 8hPGF treatments as described, with the exceptions that the CIDR was withdrawn at h −2 and the second GnRH/TAI was not performed. Rather, estrous detection was performed from d 0 to d 7 and blood samples for P4 collected at h 0, 2, 4, 12, 14, 24, 48, 72 and 96. Ultrasonography performed on d −5, −1, 3 and 10 was used to detect existing CL, induction of ovulation with the initial GnRH, regression of CL with PGF and formation of a new CL, respectively. In Expt 1, TAI pregnancy rate did not differ between 2h- and 12hPGF treatments (60.8% vs. 58%). Concentrations of P4 on d 3, 10 and 15 did not differ between treatments or pregnancy status. Concentration of E2 at h 72 did not differ with pregnancy status. In Expt 2, P4 concentrations, incidence and timing of estrus, luteal regression and other ovarian characteristics determined by ultrasonography did not differ between treatments. In conclusion, reduction of the interval to the second PGF dose from 12 to 2 h in the 5-d CO-Synch + CIDR treatment did not influence TAI pregnancy rate or the occurrence of luteal regression.

Key Words: cattle, PGF2α, timed-AI

849 Use of two coincident doses of PGF2α with the 5-d CO-Synch + CIDR estrous synchronization program. L. H. Cruppe*[1], L. A. Souto[1], M. Maquivar[1], P. Gunn[3], M. L. Mussard[1], D. Wolfenson[4], A. V. Pires[2], G. A. Bridges[3], and M. L. Day[1], [1]*The Ohio State University*, *Columbus*, [2]*University of São Paulo*, *Piracicaba, SP, Brazil*, [3]*Purdue University*, *West Lafayette, IN*, [4]*The Hebrew University*, *Rehovot, Israel*.

The aim of this study was to determine the effect of timing of the second dose of PGF2α (PGF) in the 5-d CO-Synch + CIDR program on timed-AI (TAI) pregnancy rate. Spring-calving crossbred beef cows (n = 662) at 5 locations were assigned, within parity (primi- or multiparous), by days postpartum to treatments. At 4 locations, blood samples for progesterone analysis were collected on d −15 and −5 of the experiment to determine if cows were cyclic or anestrus. All cows received 100 µg of GnRH (Cystorelin) at the time of CIDR insertion on d −5. On d 0 (h 0), the CIDR was withdrawn, tail paint applied, and all cows received their first 25 mg dose of PGF i.m. (Lutalyse). A second dose of PGF was administered either immediately following the first injection, coincident with CIDR withdrawal (CoPGF; n = 218), h 2 (2hPGF; n = 226) or h 8 (8hPGF; n = 218). At h 72, all cows received 100 µg GnRH, TAI and a tail paint score (TPS; 1 = paint absent; 2 = partial disappearance; 3 = paint undisturbed). Estrus detection and AI were performed from d 16 to 24 after TAI in 4 of 5 herds and then cows were exposed to intact bulls for the remainder of the breeding season. Pregnancy rate to TAI was determined via ultrasonography between d 28 to 43 of the breeding season and final pregnancy rate was determined after the breeding season. Data were analyzed using Glimmix procedure of SAS. Pregnancy rates to TAI did not differ and were 69.7% in the CoPGF, 65.5% in the 2hPGF and 66.1% in the 8hPGF treatments. Irrespective of treatment, TAI pregnancy rate was greater ($P = 0.05$) in multiparous (68.6%) than primiparous (59.8%) cows. There were no interactions of treatment with reproductive status, location, AI technician and sire for TAI pregnancy rate. The proportion of animals with TPS 1 (57.1%), 2 (19%) or 3 (23.9%) did not differ among treatments; however, TAI pregnancy rates were greater ($P < 0.01$) in animals with TPS 1 (73.3%) and 2 (72.2%) than with TPS 3 (48.1%). In conclusion, 2 coincident doses of PGF at CIDR withdrawal in the 5-d program results in similar TAI pregnancy rates as when given either 2 or 8 h apart.

Key Words: cattle, PGF2α, timed-AI