PHYSIOLOGY AND ENDOCRINOLOGY: NOVEL APPROACHES TO IMPROVING REPRODUCTIVE SUCCESS IN DOMESTIC ANIMALS

0521 Ovarian and endocrine responses and efficacy associated with three ovulation synchronization strategies (Heatsynch, Doublesynch, and Estradoublesynch) in Murrah buffaloes.
R. Mirmahmoudi*[1] and B. S. Prakash[2], [1]*Department of Animal Science, Faculty of Agriculture, University of Jiroft, Jiroft, Iran,* [2]*National Dairy Research Institute, Karnal, India*.

Experiments were conducted on 71 cycling and 37 anestrus buffalos to investigate; (a) the endocrine changes, timing of ovulation, and efficacy of Estradoublesynch ($PGF_{2\alpha}$ 0, GnRH 2, $PGF_{2\alpha}$ 9, Estradiol Benzoate; EB 10), Heatsynch (GnRH 0, $PGF_{2\alpha}$ 7, EB 8), and Doublesynch ($PGF_{2\alpha}$ 0, GnRH 2, $PGF_{2\alpha}$9, GnRH 11) protocols in cycling buffaloes, and (b) to compare the efficacy of Estradoublesynch, Heatsynch, and Doublesynch protocols for fertility improvement in cycling and anestrus buffaloes. Follicle size and ovulation rate were determined following all GnRH and EB treatments using transrectal ultrasonography at 2-h intervals. Plasma progesterone and total estrogen concentrations were determined in blood samples collected at daily intervals, beginning 2 d before onset of protocols until day of second ovulation detection. Plasma LH, total estrogen and progesterone concentrations were determined in blood samples collected at 30-min intervals post-GnRH and EB injections until detection of ovulation. The first ovulatory rates were significantly ($P < 0.05$) higher in Doublesynch (90%) and Estradoublesynch (83.3%) protocols than that in Heatsynch protocol (36.4%). The first LH Peak concentrations in Estradoublesynch (73.3 ± 9.2 ng/mL) and Doublesynch (99.8 ± 28.5 ng/mL) protocols were significantly ($P < 0.05$) higher than that of Heatsynch (55.3 ± 7.4 ng/mL) protocol. In both Estradoublesynch and Doublesynch protocols, the total estrogen concentration gradually increased from the day of GnRH administration coinciding with LH peak, and then gradually declined to the basal level until the time of ovulation detection. However, in Heatsynch protocol, the gradual increase in total estrogen concentration after GnRH was observed only in those buffaloes which responded to treatment with ovulation. In both Estradoublesynch and Heatsynch protocols, ovulatory follicles size increased from GnRH/EB injections until ovulation. The pregnancy rates after Estradoublesynch (62.2%) and Doublesynch (58.1%) protocols were significantly ($P < 0.05$) higher than that achieved after Heatsynch protocol (32.5%). Our observations demonstrated that the Estradoublesynch and Doublesynch protocols can be potentially used to obtained satisfactory pregnancy rates after TAI in both cycling and anestrus buffaloes.

Key Words: estradoublesynch, heatsynch, doublesynch

0522 Cholesterol-loaded cyclodextrin improves the post-thaw semen quality but not the fertility in Sahiwal bulls.
A. Sattar*[1], A. G. Tarin[1], N. Ahmad[1], K. Javed[2], M. Ahmad[1], A. Razzaq[1], K. Ahmad[3], and M. Younis[4], [1]*Department of Theriogenology, University of Veterinary and Animal Sciences, Lahore, Pakistan,* [2]*Department of Livestock Production, University of Veterinary and Animal Sciences, Lahore, Pakistan,* [3]*Livestock Experiment Station, Fazilpur, Rajanpur, Pakistan,* [4]*Semen Production Unit, Qadirabad, Sahiwal, Pakistan*.

Sahiwal cattle is the best dairy breed of Pakistan, whose purebred population is reduced to an extent where it can be declared as endangered. AI is a tested tool for genetic improvement and conservation. During cryopreservation, cholesterol is an important component in the regulation of membrane fluidity. The objective of the present study was to determine if addition of cholesterol in semen extender has a beneficial effect on its post-thaw semen quality and pregnancy rate in Sahiwal bulls. Experiment 1: Cholesterol was added to Tris-citric acid semen extender in the form of cholesterol-loaded cyclodextrin (CLC). Extended semen was incubated with CLC at room temperature for 15 min before the addition of egg yolk and glycerol. Five replicates of each bull ($n = 3$) were separately evaluated and further processed with at least 60% sperm motility. Semen samples were diluted at 37°C in extender containing either 1 mg (LOW), 2 mg (MEDIUM), 3 mg (HIGH) of CLC or without (CON) per mL containing 120 million spermatozoa. Post-thaw motility (PTM), live spermatozoa (LS), plasma membrane integrity (PMI), and normal apical ridge (NAR) were assessed using standard procedures. Mean PTM, LS, and NAR values were significantly ($P < 0.05$) higher in MEDIUM group (50.33 ± 1.50, 59.53 ± 2.32, and 65.13 ± 1.63%, respectively) as compared with CON and LOW groups, but did not differ ($P > 0.05$) with HIGH group. Mean PMI was significantly ($P < 0.05$) higher in MEDIUM group (60.73 ± 1.49%) as compared with CON, but did not differ ($P > 0.05$) with those of LOW and HIGH groups. Experiment 2: Semen doses from MEDIUM ($n = 94$) or CON ($n = 94$) were used for fertility trial ($n = 188$). Pregnancy rate was numerically higher (63%) in cows inseminated with semen of MEDIUM group as compared with CON (57%), but did not differ ($P > 0.05$). It is concluded that addition of cholesterol in MEDIUM concentration (2 mg CLC) to Sahiwal bull semen can improve post-thaw semen quality, but not fertility as compared with CON group.

Key Words: cholesterol-loaded cyclodextrin, Sahiwal bull, semen

0523 Effects of administration of prostaglandin $F_{2\alpha}$ at initiation of the 7-d CO-Synch + CIDR estrus synchronization protocol for replacement beef heifers. V. R. G. Mercadante*[1], L. E. Kozicki[2], F. M. Ciriaco[1], D. D. Henry[1], C. R. Dahlen[3], R. N. Funston[4], J. E. Larson[5], G. A. Perry[6], T. L. Steckler[7], and G. C. Lamb[1], [1]*University of Florida, Marianna,* [2]*Pontifical Catholic University (PUCPR), Curitiba, Brazil,* [3]*North Dakota State University, Fargo, ND,* [4]*University of Nebraska, North Platte,* [5]*Mississippi State University, Mississippi State,* [6]*South Dakota State University, Brookings,* [7]*University of Illinois, Simpson.*

We determined the effect of administration of $PGF_{2\alpha}$ at CIDR (controlled internal drug release device) insertion during the 7-d COSynch + CIDR ovulation synchronization protocol on subsequent pregnancy rates of replacement beef heifers. At 10 locations, heifers were synchronized with the 7-d CO-Synch + CIDR protocol (100 µg injection of GnRH at CIDR insertion [d -10] with 25 mg injection of $PGF_{2\alpha}$ at CIDR removal [d -3], followed by an injection of GnRH and fixed-time artificial insemination [TAI] 54 h later on d 0). Heifers were stratified by BCS before being assigned to 1 of 2 treatments: (1) CO-Synch + CIDR ($n = 498$); and (2) heifers received a 25 mg injection of PGF at CIDR insertion of the CO-Synch + CIDR protcol (PG-CO-Synch + CIDR; $n = 501$). Follicle dynamics and corpus luteum development were assessed on d -10 and -3, and pregnancy status determined on d 30 to 35. Blood was collected on d -20, -10, -3, and 0 to determine P4. Overall TAI pregnancy rates (54.0 ± 2.9% and 50.7 ± 2.9%, for CO-Synch + CIDR and PG-CO-Synch + CIDR, respectively) did not differ ($P = 0.428$) between treatments. A location effect ($P < 0.001$) existed with pregnancy rates being the greatest at the FL1 location (75.0 ± 8.1%) and the poorest at the MS1 location (28.6 ± 9.3%). Of the 521 heifers in which cyclic status was assessed 81% had attained puberty. No treatment × cyclic status interaction existed; however, pregnancy rates of heifers that had attained puberty (55.0 ± 2.5%) tended ($P = 0.080$) to be greater than those heifers that were prepubertal (44.2 ± 5.2%). A treatment × concentrations of P4 interaction existed where concentrations of P4 were greater ($P < 0.001$) for CO-Synch + CIDR (6.31 ± 0.40 ng/mL) than PG-CO-Synch + CIDR (4.63 ± 0.40 ng/mL) on d -3. Similarly, corpus luteum (CL) volume did not differ between treatments on d -10, but CL volume tended ($P = 0.059$) to be greater for CO-Synch + CIDR (2.24 ± 1.14 cm^3) than PG-CO-Synch + CIDR (1.47 ± 1.14 cm^3) on d -3. Diameter of the largest follicle on d -10 (10.7 ± 1.4 mm) and -3 (11.6 ± 1.4 mm) did not differ between treatments. We concluded that administration of $PGF_{2\alpha}$ at CIDR insertion of the CO-Synch + CIDR protocol failed to increase TAI pregnancy rates in replacement beef heifers, but decreased concentrations of P4 and tended to decrease CL volume at CIDR removal.

Key Words: ovulation synchronization, artificial insemination, beef heifer

0524 Modifications to Ovsynch improve fertility during resynchronization: Evaluation of presynchronization with GnRH 6 d before Ovsynch and addition of a second PGF treatment. P. D. Carvalho*[1], M. J. Fuenzalida[2], A. Ricci[2], M. Luchterhand[2], J. M. Mulcahy[2], R. V. Barletta[2], G. M. Baez[2], V. G. Santos[2], M. C. Amundson[2], J. N. Guenther[2], A. H. Sousa[2,3], M. C. Wiltbank[1], and P. M. Fricke[2], [1]*University of Wisconsin, Madison,* [2]*Department of Dairy Science, University of Wisconsin-Madison, Madison,* [3]*University of California Cooperative Extension, Tulare.*

Recent modifications to Ovsynch, such as presynchronization with GnRH and addition of a second PGF have, at times, appeared to improve synchronization and fertility to the timed AI protocol; however, combining these 2 methods may further optimize the hormonal environment. Lactating Holstein cows were randomly assigned to a 2x2 factorial design to compare main effects of presynchronization with GnRH (± GnRH) 6 d before beginning an Ovsynch protocol, and a second PGF injection (± PGF) administered 24 h after the first on P/AI. For first TAI, cows were presynchronized with 2 injections of PGF 14 d apart, and cows detected in estrus after the second PGF injection were inseminated and removed from the experiment. Nonpregnant cows were resynchronized using an Ovsynch protocol initiated 32 ± 3 d after AI. Blood samples collected from all cows at the first GnRH (G1), at the PGF, and at the last GnRH (G2) injections of the Ovsynch protocol were assayed for progesterone (P4) concentrations. At 32 d after TAI, pregnancies per AI (P/AI) was greatest for cows presynchronized with GnRH and receiving a second PGF injection, intermediate for cows receiving the second PGF injection only and for cows presynchronized with GnRH only, and least for controls [(39.6% (91/230), 35.6% (73/205), 31.8% (77/242), 30.3% (67/221), respectively; $P = 0.18$]. Interestingly, treatments affected P/AI only for resynchronized cows [41.0% (57/139), 32.8% (39/119), 27.9% (41/147), 24.6% (35/142), respectively; $P = 0.02$], but not for cows receiving first TAI [37.4% (34/91), 39.5% (34/86), 37.9% (36/95), 40.5% (32/79), respectively, $P = 0.96$]. Fewer ($P < 0.01$) cows presynchronized with GnRH had low (< 0.5 ng/mL) P4 at G1 compared with cows not presynchronized (12.8 vs. 24.8%), and P4 was greater ($P = 0.05$) at the PGF injection for cows presynchronized with GnRH (4.4 vs. 4.0 ng/mL). Surprisingly, differences in P4 at PGF were only detected for resynchronized cows ($P = 0.09$) and not for cows receiving first TAI ($P = 0.23$). Cows receiving the second PGF injection had less ($P < 0.01$) P4 at G2 compared with cows not receiving the second PGF injection (0.2 vs. 0.4 ng/mL). We conclude that presynchronization with GnRH 6 d before

beginning an Ovsynch protocol increased P4 at the PGF injection of an Ovsynch protocol, and a second PGF injection 24 h after the first decreased P4 at TAI resulting in more P/AI in resynchronized cows. Supported by Hatch project WIS01171.

Key Words: Ovsynch; resynchronization; fertility

0525 The effects of prenatal stress and postnatal temperament on age and body weight at first sperm, puberty, and sexual maturity in Brahman bulls. M. C. Roberts*[1], R. C. Vann[2], D. A. Neuendorff[1], B. P. Littlejohn[1], D. G. Riley[3], J. A. Carroll[4], T. H. Welsh, Jr.[5], and R. D. Randel[1], *[1]Texas A&M AgriLife Research, Overton, [2]MAFES–Brown Loam Experiment Station, Mississippi State University, Raymond, [3]Texas A&M AgriLife Research, College Station, [4]USDA-ARS, Livestock Issues Research Unit, Lubbock, TX, [5]Texas A&M University Department of Animal Science, College Station.*

The objectives of this study were to determine if prenatal stress (PNS) or postnatal temperament affect age and BW at first sperm, puberty, and sexual maturity. Based on temperament, pregnant Brahman cows were assigned to a control (n = 44; C) or transport group (n = 45; transportation stress for 2 h on 60, 80, 100, 120, and 140 ± 5d of gestation; PNS). At weaning, bulls (n = 25 C and n = 18 PNS) were selected for this study. Temperament was assessed at weaning using temperament score [TS; (PS + EV)/2], pen score (PS; 1 = calm and 5 = excitable), and exit velocity (EV = m/s). These TS were then converted into temperament classes of calm (TS = < 1.78, n = 26), intermediate (TS = 1.7 to 2.90, n = 9) and temperamental (TS = > 2.90, n = 8). Bulls were measured every 2 wk from 10 mo of age for BW, scrotal circumference (SC), and right and left testis length. Electroejaculation was used to collect semen when SC reached 24 cm. Semen was analyzed for sperm motility and concentration using a hemacytometer. Sexual maturation was characterized by first sperm (the first visible sperm in the ejaculate), puberty (50×10^6 sperm in the ejaculate), and sexual maturity (500×10^6 sperm in the ejaculate). Paired testes volume (PTV) was calculated as PTV = [$0.0396125 \times$ (average testes length) $\times$ (SC)^2]. Dependent variables were analyzed using repeated measures, mixed linear models. Fixed effects included temperament class, treatment, and interaction effects. Random animal effects were across repeated days. Age at first sperm, puberty and sexual maturity were similar between C and PNS bulls (P = 0.47, 0.73, 0.99, respectively). Times between first sperm and puberty (P = 0.32) and puberty to sexual maturity (P = 0.92) were not affected by PNS. Temperamental bulls had a greater (P = 0.009) time (69.25 ± 11.45 d) from puberty to sexual maturity than calm (28.47 ± 7.53 d) or intermediate bulls (38.19 ± 9.95 d). BW at first sperm was greater for PNS (382.16 ± 11.29 kg) than C bulls (353.19 ± 10.55 kg). Scrotal circumference at first sperm was greater (P = 0.03) in temperamental (26.8 ± 0.7 cm) than calm (25.5 ± 0.5 cm) or intermediate (25.1 ± 0.6 cm) bulls. There was a tendency for temperamental bulls to have a greater PTV at first sperm (P = 0.06) and sexual maturity (P = 0.07) than calm or intermediate bulls. While PNS influenced BW, SC, and PTV at first sperm, ages at puberty or sexual maturity were not affected by PNS. Temperamental bulls had retarded sexual development between puberty and sexual maturity.

Key Words: prenatal stress, temperament, bull sexual maturity

---

0526 Equine chorionic gonadotropin improves follicular dynamics, estrus expression, ovulation, and pregnancy rate in controlled internal drug release device based estrus synchronization protocol in Nili-Ravi buffalo. M. I. Naveed, A. Husnain, U. Riaz, M. Hassan, A. Sattar*, and N. Ahmad, *Department of Theriogenology, University of Veterinary and Animal Sciences, Lahore, Pakistan.*

Reproduction of buffalo is hampered due to poor ovarian reserves, vague estrus signs, anestrus, prolonged postpartum and calving intervals, and decreased fertility. Synchronization of estrus and ovulation including CIDR (controlled internal drug release device) based protocols are well established in cows and are gaining popularity in buffaloes. However, these need modifications based on physiology of estrous cycle in buffaloes. The present study tested the hypothesis that if the addition of equine chorionic gonadotropin (eCG) to a CIDR based synchronization protocol improves ovarian follicular dynamics, estrus behavior, ovulation and pregnancy rate in Nili-Ravi buffalo. Lactating multiparous Nili-Ravi buffaloes (n = 88) received CIDR (1.38 g progesterone Pfizer Co, USA) device for 7 d and prostaglandin F2α (Dalmazine, cloprostenol, Fatro, Italy) on d 6. These buffaloes were randomly assigned to receive either saline (without eCG, n = 45) or equine chorionic gonadotropin 1000 IU (Chronogest PMSG, Intervet, Holland) i.m. (eCG, n = 43) concurrent with prostaglandin F2α treatment of the CIDR protocol (d 6). Fixed time, 2 inseminations were performed at 48 and 60 h after CIDR removal (d 7). Pregnancy was diagnosed 35 to 40 d post-AI using transrectal ultrasonography. The mean size of dominant follicle just before ovulation did not differ in eCG treated buffaloes compared with or without eCG (14.8 ± 0.3 vs.14.5 ± 0.5; P > 0.05). Mean growth rate of the ovulatory follicle was higher in the eCG group compared with without eCG (1.8 mm ± 0.0 vs.1.4 mm ± 0.1; P < 0.05). Mean interval from CIDR removal to ovulation was shorter in eCG-treated buffaloes compared to no eCG (70.9 ± 2.0 h vs. 77.5 ± 2.3 h; P < 0.05). The estrus response and intensity was greater in the eCG group than the group without eCG (100 vs. 91%; P < 0.05), (3.2 ± 0.1vs. 2.4 ± 0.1; P < 0.05), respectively. Similarly, ovulation and pregnancy rates were higher in the eCG group than those without eCG (82.9% [34/41] vs. 69.4% [26/37]; P > 0.05), (53.4% [23/43] vs. 24.4% [11/45]; P < 0.05), respectively. Therefore,

we conclude that addition of eCG before P4 device removal improves ovulatory follicle growth rate, estrus behavior, and pregnancy rate in FTAI program in buffalo. These data have strong implications in hastening buffalo reproduction.

Key Words: equine chorionic gonadotropin, fertility, buffalo

0527 Effects of prenatal transportation stress on endogenous and exogenously-induced luteinizing hormone secretion in sexually mature Brahman bulls. B. P. Littlejohn*[1,2], M. C. Roberts[1,2], M. N. Bedenbaugh[1], A. W. Lewis[2], D. A. Neuendorff[2], D. G. Riley[1,3], J. A. Carroll[4], R. C. Vann[5], M. Amstalden[1], T. H. Welsh, Jr.[1,3], and R. D. Randel[2], [1]*Texas A&M University Department of Animal Science, College Station,* [2]*Texas A&M AgriLife Research, Overton,* [3]*Texas A&M AgriLife Research, College Station,* [4]*USDA-ARS, Livestock Issues Research Unit, Lubbock, TX,* [5]*MAFES–Brown Loam Experiment Station, Mississippi State University, Raymond.*

The effect of prenatal transportation stress (PNS) on secretion of LH before and after GnRH stimulation in sexually mature Brahman bulls was studied in 12 control and 11 PNS bulls. Control bulls were derived from nontransported pregnant cows, and PNS bulls were derived from cows transported for a 2-h period at 60, 80, 100, 120, and 140 ± 5 d of gestation. Temperament of each bull was assessed at weaning by pen score (PS; 1 = calm and 5 = excitable), exit velocity (EV; m/sec) and temperament score [TS = (PS + EV)/2]. Bulls were electroejaculated every 2 wk beginning at a scrotal circumference of 24 cm through sexual maturity (i.e., 500,000,000 sperm/ejaculate). Within 7 to 21 d after reaching sexual maturity, bulls were fitted with jugular vein cannulas, and blood samples were collected at 15-min intervals for 6 h to determine the pattern of LH release. GnRH was then administered intravenously (10 ng/kg BW) and blood collection continued at 15-min intervals for an additional 8 h. Concentrations of LH in serum were determined by RIA. Amplitude of a detectable LH pulse, baseline concentration of LH, and area under the LH curve (AUC) were calculated for the 4-h period immediately preceding GnRH administration. Luteinizing hormone pulse incidence was evaluated using Pulse XP algorithm. The amplitude and height of the GnRH-induced LH release, AUC post-GnRH administration, and the duration of the GnRH-induced LH release were determined. Data were analyzed using a fixed effect model, with treatment and temperament classification included in the model. The occurrence of LH pulses during the pre-GnRH period was compared between treatment groups by chi-square analysis. More PNS bulls exhibited an LH pulse before GnRH injection (10 of 11; $P < 0.01$) than control bulls (3 of 12). No other characteristic associated with the release of LH during the pre-GnRH treatment evaluated in this study differed between groups ($P > 0.1$). All bulls responded similarly to exogenous GnRH, with the exception of the duration of the LH response which was greater ($P = 0.02$) in PNS bulls (268 ± 18 min) relative to control bulls (207 ± 16 min). Pattern of LH secretion before GnRH and duration of GnRH-induced LH release differed between PNS and control bulls. Stress during prenatal development may affect secretion of LH in sexually mature Brahman bulls.

Key Words: bulls, prenatal stress, luteinizing hormone

0528 Effects of artificial insemination and natural service breeding systems on calving characteristics and weaning weights of resultant progeny. P. L. Steichen[1], S. I. Klein[1], Q. Larson[1], K. M. Bischoff[2], V. R. G. Mercadante[3], G. C. Lamb[3], C. S. Schauer[4], B. W. Neville[5], and C. R. Dahlen*[1], [1]*North Dakota State University, Fargo,* [2]*University of Florida, NFREC, Marianna,* [3]*University of Florida, Marianna,* [4]*Hettinger Research Extension Center, Hettinger, ND,* [5]*North Dakota State University, Streeter.*

Angus crossbred females ($n = 1067$) were used to evaluate effects of 2 breeding systems on calving characteristics and weaning weight of progeny. In 2 yr, females were stratified by age and BCS, then assigned randomly to 1 of 2 breeding systems: (1) exposed to natural service bulls for duration of the breeding season (NS; $n = 541$), or (2) exposed to ovulation synchronization and a fixed-time AI (7-d CO-Synch + CIDR) on d 0, followed by exposure to natural service bulls for duration of the breeding season (TAI, $n = 535$). Bulls were introduced to all females on d 1 and both treatments were managed as a cohort in the same pastures. Calving date, calving ease (scale of 1 to 5; 1 = no assistance and 5 = caesarean), calf vigor (scale of 1 to 5; 1 = normal calf and 5 = stillbirth), and birth weights were recorded within 24 h of calf birth and weights were also collected from each calf at weaning. Binomial data were analyzed using Proc GLIMMIX of SAS (SAS Inst. Inc., Cary, NC), whereas continuous data were analyzed using Proc GLM. More ($P < 0.01$) TAI females (53.2%) gave birth in the first 21 d of the calving season compared with the NS treatment (41.3%). From d 22 to 42, more ($P < 0.01$) females in the NS treatment (32.3%) gave birth compared with females in the TAI treatment (21.6%). No differences ($P \geq 0.34$) existed between treatments in the proportion of females that calved after d 43 or failed to have a calf. Overall mean calving date for females in the TAI treatment (d 16.7 ± 0.05 d) was 7 d earlier ($P < 0.01$) than that of females in the NS treatment (d 23.6 ± 0.93). However, no differences ($P \geq 0.37$) were present between treatments in calving ease (1.13 ± 0.02) or calf vigor (1.13 ± 0.04). Calves from the TAI treatment (37.9 ± 0.32 kg) were lighter at birth compared with calves from the NS treatment (39.5 ± 0.35 kg). In contrast, calves from the TAI treatment (207.3 ± 1.51 kg) had greater ($P = 0.01$) weaning weights compared with calves from the NS treatment (202.4 ± 1.50 kg). Incorporation of TAI into beef cattle breeding systems resulted

in calves born earlier in the calving season and heavier calves at weaning compared with natural service breeding systems.

Key Words: artificial insemination, calving characteristics, natural service

---

0529 Impact of manipulation of progesterone concentrations during follicular development on ovulatory follicle growth and timed artificial insemination pregnancy rate in beef cows.
F. M. Abreu*[1], M. A. Coutinho da Silva[1], L. H. Cruppe[1], M. L. Mussard[1], B. R. Harstine[1], G. A. Bridges[2], T. W. Geary[3], and M. L. Day[1], *[1]The Ohio State University, Columbus, [2]University of Minnesota, Grand Rapids, [3]USDA ARS Fort Keogh, Miles City, MT.*

This experiment was conducted to investigate the role of decreased progesterone (P4) concentrations during follicular development on fertility in multiparous beef cows ($n = 228$; Angus × Simmental) from 3 locations ($n = 92$; $n = 63$; $n = 73$). Ovulation was presynchronized with the 5-d CO-Synch + CIDR (controlled internal drug release device) program with the day of the final GnRH designated as d −6. On d 0, all ovarian follicles were ablated. Cows were stratified by age and days postpartum within location, and assigned to receive either a previously used CIDR and two 25-mg PGF doses 8 h apart (low-P4; L; $n = 115$) or a new CIDR (high-P4; H; $n = 113$) on d 0. On d 5, CIDR were removed, two 25-mg PGF doses administered and estrus detection tail paint applied. Tail paint scoring (TPS; 1 = paint completely removed; 2 = paint partially removed; 3 = paint largely undisturbed and no evidence of mounting), timed-AI (TAI) and administration of 100 µg GnRH were performed on d 8. Blood samples for P4 analysis were collected on d 5. Ultrasonography was conducted on d 0, 5, and 8 to assess ovarian structures, and d 35 for pregnancy diagnosis. Cows without a CL on d 0 were removed from all analyses. Across locations, P4 concentrations on d 5 were greater ($P < 0.05$) in the H (4.91 ± 0.13 ng/mL) than L (0.99 ± 0.06 ng/mL); a treatment by location interaction ($P < 0.05$), predominantly due to elevated P4 concentrations in 1 location, was detected. Follicle diameter on d 5 was greater ($P < 0.05$) in the L (8.9 ± 0.2 mm) than H (7.4 ± 0.1 mm) treatment, but did not differ between treatments (12.0 ± 0.1 mm) at TAI. Hence, follicle growth from d 5 to 8 was greater ($P < 0.05$) in the H (1.5 ± 0.1 mm/d) than in the L (1.3 ± 0.1 mm/d) treatment. Distribution of TPS differed ($P < 0.05$) between treatments with a majority of cows in the H treatment with TPS 3 (57%) and a majority in the L treatment with TPS 1 (54%). Cows with TPS 1 or 2 had a greater ($P < 0.05$) PR than cows with a TPS 3. However, PR did not differ between the H (67.3%) and L (67.8%) treatments. In conclusion, decreased P4 resulted in an increased percentage of cows in estrus before TAI, but did not impact timed AI pregnancy rate in beef cows.

Key Words: progesterone, fertility, cows

0530 Reproductive performance of lactating dairy cows after resynchronization with ovsynch or a program aimed to maximize artificial insemination in estrus and fertility of timed artificial inseminations based on ovarian structures.
J. O. Giordano*[1], R. D. Watters[2], R. Wijma[1], and M. L. Stangaferro[1], *[1]Department of Animal Science, Cornell University, Ithaca, NY, [2]Quality Milk Production Services, Cornell University, Ithaca, NY.*

Our objective was to compare the reproductive performance of dairy cows after enrollment in a program that combined resynchronization with Ovsynch and AI in estrus based on activity (AIAct) vs. a program aimed to maximize AIAct and fertility of timed AI (TAI) services by assigning treatments according to the ovarian structures present at nonpregnancy diagnosis (NPD). One day after NPD by transrectal ultrasonography at 31 ± 3 d after AI, lactating cows were blocked by parity (primiparous vs. multiparous) and randomly assigned to: (1) Control (CON; $n = 469$): resynchronization with Ovsynch-56 (GnRH-7d-PGF-56h-GnRH-16h-TAI) at 32 ± 3 d after AI combined with AIAct or 2) Treatment (TRT; $n = 430$): cows with a corpus luteum (CL) ≥ 20 mm (TRT-CL) received a PGF injection and AIAct for 9 d. Cows with no CL or CL < 20 mm (TRT-NoCL) received a GnRH injection 2 d after enrollment. Cows in TRT-CL and TRT-NoCL not AIAct were enrolled in a 5d-Ovsynch+Progeterone protocol (GnRH + CIDR-5d-PGF + CIDRremoval-1d-PGF-32h-GnRH-16h-TAI) 9 and 7 d after the PGF or GnRH injection, respectively. The percentage of cows with a CL ≥ 20 mm at NPD was similar ($P = 0.79$) for CON (64.2%; 301/469) and TRT (63.3%; 272/430) whereas, it was greater ($P = 0.005$) for multiparous than primiparous cows (66.8 vs. 57.1%). Cows in CON (mean 9.5 d, median 10 d) were reinseminated at a faster rate ($P < 0.01$; HR 2.9 CI: 2.4 to 3.5) than cows in TRT (mean 13.2 d, median 17 d). Parity did not affect ($P = 0.76$) time to reinsemination. After enrollment, a greater ($P < 0.001$) percentage of cows received AIAct in TRT (29.8%) than CON (10.4%) whereas, a greater ($P < 0.001$) percentage of cows were AIAct in TRT-CL (38.6%) than TRT-NoCL (14.6%). Pregnancies per AI (P/AI) for cows AIAct were similar ($P = 0.65$) for CON (32.7%; 16/49) and TRT (28.8%; 36/125) and were not affected by parity ($P = 0.37$). Also, P/AI after TAI were similar ($P = 0.47$) for CON (27.9%; 113/405) and TRT (30.4%; 87/286) and were not affected by parity ($P = 0.55$). Pregnancy rate from 0 to 21 d after enrollment was similar ($P = 0.62$) for CON (28.4%; 129/454) and TRT (29.9%; 123/411). Thus, compared with a typical resynchronization program, a program aimed to maximize AIAct and fertility of TAI by assigning treatments according to ovarian structures; increased the percentage of cows AIAct and had similar pregnancy rate by 21 d after NPD, however, time to reinsemination was delayed which could be explained by the small percentage of cows inseminated on activity.

Key Words: resynchronization, estrous activity, dairy cow