200 Assessment of vaginal electrical resistance (VER) as an indicator of follicular maturity and suitability for timed AI in cows subjected to a synchronization of ovulation protocol. J. F. Zuluaga*, J. P. Saldarriaga, D. A. Cooper, J. A. Cartmill, and G. L. Williams, *Texas A&M Agricultural Research Station*, *Beeville*.

Objectives were to use retrospective analysis to determine the efficacy of VER for identifying cows with and without a mature preovulatory follicle (defined as ≥ 10 mm) at timed AI (TAI) and as a prospective decision aid for determining cows that should not be bred. Brahman x Hereford (F1) females (n=233) were synchronized with the CO-Synch + CIDR protocol that consisted of an Eazy-Breed CIDR and i.m. injection of GnRH (GnRH-1; 100 µg) on d 0, removal of CIDR and i.m. injection of Prostaglandin F2α (PGF; 25 mg) on d 7, and i.m. injection of GnRH (GnRH-2, 100 µg) and TAI 66 h after CIDR removal (d 10). A commercially-available device (Ovascan; Animark Inc., Aurora, CO) was used to determine VER at d 0, 7, and 10. Transrectal ultrasonography was used on d 10 to assess ovarian morphology at TAI in all cattle and in a subset of females (n=98) on d 0 and 7. Mean (± SEM) age, BCS, BW and d postpartum were 7.2 ± 0.3 yr, 5.2 ± 0.1, 538 ± 5.3 kg, and 77 ± 1.1 d, respectively. Mean VER (ohms) was greatest (101.8 ± 1.1) on d 0 and declined ($P < 0.01$) to 95 ± 0.7 and 82.4 ± 0.7 ohms, respectively, on d 7 and 10. We observed a low negative relationship ($r = - 0.35$; $P < 0.001$) between follicular size and VER on d 0, 7, and 10. Timed AI conception rate was correlated positively ($r = 0.16$; $P < 0.05$) with follicular size and negatively ($r = - 0.15$; $P < 0.05$) with VER at TAI. Timed AI conception rate was also correlated with changes in follicular size (FollSizediff; $r = 0.24$; $P < 0.05$) and VER (VERdiff; $r = - 0.18$; $P < 0.01$) between d 10 and 7. However, VERdiff and FollSizediff were not correlated. Vaginal electrical resistance at TAI and VERdiff did not differ between females that became pregnant and those that did not. Females without a large follicle on d 10 were not identifiable with VER.

Supported by TAES and Animark Inc.

Key Words: Vaginal electrical resistance, Follicular size, Synchronization

201 Influence of preovulatory concentrations of estradiol on interval to ovulation and uterine pH. G. A. Perry* and B. L. Perry, *South Dakota State University*, *Brookings*.

Research has shown following the CO-Synch protocol, cows in estrus within 24 h of TAI had elevated concentrations of estradiol, a shorter interval to ovulation, and greater pregnancy rates compared to cows not in estrus. Our objective was to assess the influence of elevating preovulatory concentrations of estradiol on the percentage of animals exhibiting standing estrus, the interval to ovulation, and the uterine environment. Lactating beef cows (n = 57) received the CO-Synch protocol (100 µg GnRH on d -9; 25 mg PG on d -2; and 100 µg GnRH on d 0). Half the cows received an injection of estradiol cypionate (ECP; 1mg) 12 h after the PG injection. More cows administered ECP exhibited estrus ($P < 0.01$) compared to cows not administered ECP (66% vs. 25%). No difference ($P = 0.20$) was detected in the interval from GnRH to ovulation between treatments (27.4 ± 1.1 and 29.4 ± 1.1 h for ECP and control, respectively), but cows that exhibited estrus had a shorter interval to ovulation ($P < 0.03$) compared to cows that did not exhibit standing estrus (25.4 ± 1.1, 26.0 ± 1.7, 32.0 ± 1.7, and 30.9 ± 1.1 h for ECP estrus, no ECP estrus, ECP no estrus, and no ECP no estrus, respectively). Among cows not administered ECP, cows that exhibited estrus within 24 h of GnRH tended ($P = 0.09$) to have a lower uterine pH at the time of the second GnRH injection compared to cows not exhibiting standing estrus (6.8 ± 0.09 vs. 7.0 ± 0.07, respectively). Cows administered ECP were intermediate (6.9 ± 0.05). Cows that initiated estrus after the time of pH determination had a similar pH as cows that did not receive ECP and did not exhibit estrus ($P > 0.47$; 7.09 ± 0.17). Cows that received ECP and did not exhibit estrus or initiated estrus within 1 h of pH measurement tended ($P \leq 0.10$) to have a lower pH (6.79 ± 0.09) compared to cows that did not receive ECP and did not exhibit estrus. In summary, elevating preovulatory concentrations of estradiol increased the proportion of cows exhibiting standing estrus and decreased uterine pH to a level similar to cows exhibiting standing estrus.

Key Words: Fixed-time AI, Uterine environment, Estradiol

202 Optimizing ovulation to 1st GnRH improved outcomes to each hormonal injection of Ovsynch in lactating dairy cows. N. M. Bello*, J. P. Steibel, and J. R. Pursley, *Michigan State University*, *East Lansing*.

Ovulatory response to 1st GnRH of Ovsynch is the critical determinant for successful synchronization of ovulation in dairy cows. Our objective was to develop a pre-Ovsynch treatment that increases the percentage of cows that ovulate to 1st GnRH of Ovsynch. To accomplish our goal, we evaluated a strategy based on $PGF_{2\alpha}$ and GnRH administered prior to 1st GnRH of Ovsynch. Lactating dairy cows (n = 137) were assigned to receive either no treatment prior to Ovsynch (Control) or 25 mg of $PGF_{2\alpha}$ (Pre-P) followed 2 d later by 100 mg of GnRH (Pre-G), administered 4 (G4G), 5 (G5G) or 6 (G6G) d prior to 1st GnRH of Ovsynch. Transrectal ultrasonography was performed to assess follicular size and ovulation, and blood samples were collected to measure circulating concentrations of P_4 and E_2. Cows were AI 16 h after final GnRH of Ovsynch. Pregnancy diagnosis was performed 35 d later by palpation. Proportion of cows that ovulated to 1st GnRH of Ovsynch was 56.0, 66.7, 84.6 and 53.8% for G4G, G5G, G6G and controls, respectively, and was greater for G6G vs. controls ($P<0.03$). Luteolytic response to $PGF_{2\alpha}$ of Ovsynch was greater in treated vs. control cows (92.0, 91.7, 96.2 and 69.2% for G4G, G5G, G6G and Control, respectively; $P<0.05$). Synchronization rate to Ovsynch was greater (92 vs. 69%, respectively; $P=0.05$) in G6G vs. controls. Also, cows that ovulated in response to 1st GnRH of Ovsynch had greater response to $PGF_{2\alpha}$ of Ovsynch (92.7 vs. 77.1 %, respectively; $P<0.03$) and greater synchronization rate to the overall protocol (87.9 vs. 62.9%, respectively; $P<0.005$) than those that did not. Concentrations of P_4 at $PGF_{2\alpha}$, and E_2 and follicle size at final GnRH of Ovsynch, were identified as significant predictors of probability of pregnancy 35 d after AI. In summary, a $PGF_{2\alpha}$ -and-GnRH based Pre-Ovsynch strategy with a 6-d interval between Pre-G and 1st GnRH of Ovsynch resulted in a greater ovulatory and luteolytic response to 1st GnRH and $PGF_{2\alpha}$ of Ovsynch, respectively, compared to controls. This, in turn, optimized synchronization rate to Ovsynch.

Key Words: Dairy cow, Ovsynch, Follicle maturation

203 Delaying injection of prostaglandin $F_{2\alpha}$ (PGF) in an Ovsynch protocol. J. S. Stevenson*, M. A. Portaluppi, and D. E. Tenhouse, *Kansas State University*, *Manhattan*.

Our objective was to determine whether delaying PGF injection by 24 or 48 h after the first GnRH injection in an Ovsynch protocol altered

ovarian characteristics in dairy cows. Beginning 9 d after removal of a CIDR insert and injection of PGF (d 7 of the estrous cycle; 65 DIM), 36 Holsteins (average BW = 707 kg and BCS = 2.2) were given 100 µg of GnRH and assigned randomly to receive 25 mg of PGF 7, 8, or 9 d later. Timed AI was performed at 48 h after PGF at which time a second injection of GnRH was administered (91 DIM). Day 0 represented the first day of the Ovsynch protocol, initiated on d 7 of the estrous cycle. Ovarian structures were mapped by ultrasonography on d 0 and 2 to determine responses to the first GnRH injection, at PGF injection, and daily thereafter for 4 d. Blood was collected on d 0, 2, at PGF injection, and at 24 and 48 h after PGF to monitor progesterone (P4). Based on serum P4 and ovarian exams, 2 anestrous cows were eliminated, but 3 others were retained because they ovulated in response to the first GnRH injection. Final numbers of cows per treatment were: 7 d (n = 13); 8 d (n = 9); and 9 d (n = 10). Pretreatment responses: 27 of 32 cows ovulated (87.5%) in response to the first GnRH injection (d 0); number (d 0) of follicles ≥ 10 mm (1.9 ± 0.2); number (d 0) of original CL (1.3 ± 0.1); number (d 7) of new CL (1.0 ± 0.1); total CL (d 7) at PGF (2.3 ± 0.1); and diameter of follicles (d 0) that ovulated (13.1 ± 0.4 mm). Of cows not ovulating in response to the first GnRH injection, 3 had 2 original CL and 2 had 1 original CL. Despite a 24- or 48-h delay between first GnRH and PGF injections, diameter (mm) and volume (mm^3) of the ovulatory follicle did not differ among treatments: 7 d (13.9 ± 0.2; 1526 ± 62); 8 d (13.7 ± 0.3; 1479 ± 97); and 9 d (13.7 ± 0.2; 1490 ± 69). All cows ovulated at least one follicle and ovulation rates did not differ: 1.2 ± 0.1, 1.1 ± 0.1, and 1.3 ± 0.2, respectively. Four cows in the 7-d treatment inseminated 24 h late were excluded before assessing conception rates (P = 0.07): 5/9 (55.6%); 5/9 (55.6%); and 1/10 (10%), respectively. We concluded that delaying PGF by 24, but not 48 h, had little effect on outcomes.

Key Words: Ovsynch, Ovulation, Follicle

204 Effects on conception rates of lactating dairy cows by altering the time of the second GnRH and AI during Ovsynch. D. J. Brusveen*, A. P. Cunha, C. D. Silva, P. M. Cunha, R. A. Sterry, E. P. B. Silva, J. N. Guenther, and M. C. Wiltbank, *University of Wisconsin*, *Madison*.

A recent study (Portaluppi & Stevenson, 2005; JDS 88:914) indicated that CoSynch at 72 h after PGF had better conception rates (CR) than Cosynch at 48 h using data from first AI after Presynch. In this study we reexamined these 2 programs at first AI (Presynch) and at later services (Resynch). Further, we hypothesized that CR would be improved to a greater extent when GnRH was administered at 56 h after PGF prior to AI at 72 h due to a more optimal interval (16 h) between the LH surge and AI. A total of 1507 AIs in 927 lactating dairy cows were randomly assigned to one of three treatments by pen from August to December 2005. Cows ranged from 30 to 36 DIM at start of Presynch (two injections of PGF 14 d apart with the second injection 11 d before Ovsynch). All cows received GnRH followed 7 d later by PGF and then received one of the following: 1) GnRH + TAI 48 h after PGF (G48) 2) GnRH 56 h after PGF + TAI 72 h after PGF (G56) or 3) GnRH + TAI 72 h after PGF (G72). Pregnancy diagnoses were performed by ultrasound at 31 to 33 d post-AI and again at 52-54 d post-AI. CR were similar (P>0.1) for the G48 and G72 groups (26.7% and 27.2%, respectively). The G56 group had a much greater CR (36.2%) than G48 (P=0.006) or G72 (P=0.002) groups. Cows at first AI (Presynch) had greater CR than cows at later AIs (Resynch) in G48 (37.8 vs. 23.6%; P=0.002) and G56 (45.2 vs. 33.1%; P=0.021) but not in G72 (27.5 vs. 27.3%; P>0.1). Similarly, primiparous cows had greater CR than multiparous cows in G48 (34.1 vs. 23.1%; P=0.009) and G56 (41.3 vs. 32.7%; P=0.065) but not G72 (29.8 vs. 25.4%; P=0.264). Pregnancy loss was higher for primiparous than multiparous cows in the G48 and G56 groups but not in G72 (P=0.02, P=0.016, and P>0.1, respectively). In conclusion, we found no advantage to Cosynch at 72 h vs. 48 h either at first or later AIs. In contrast, we found a clear advantage to treating with GnRH at 56 h prior to a 72 h AI probably due to the more optimal timing of AI prior to ovulation.

Key Words: Ovsynch, GnRH, TAI

205 Effect of synchronization protocols on follicular development of dairy heifers. J. L. Stevenson*[1], R. C. Chebel[1], J. C. Dalton[1], J. E. P. Santos[2], R. Sartori[3], and A. Ahmadzadeh[4], [1]*University of Idaho*, *Caldwell*, [2]*University of California-Davis*, *Tulare*, [3]*EMBRAPA*, *Brasilia, DF, Brazil*, [4]*University of Idaho*, *Moscow*.

The objective of the present study was to evaluate the effect of synchronization protocols on follicular development of dairy heifers. Holstein heifers (n = 151), 13 mo of age, were assigned to one of four synchronization protocols in a 2 x 2 factorial arrangement, presynchronization (PRES) or no presynchronization (NPRES) with GnRH on study d -6 (study d 0 = initiation of the Co-Synch) and an injection of PGF2a (PGF) or no injection of PGF2a (NPGF) on study d 0. This resulted in 4 treatments (NPRES and NPGF; PRES and NPGF; NPRES and PGF; PRES and PGF). On d 0, all heifers received the Co-Synch protocol with a CIDR insert for 7 d. After the PGF2a of the Co-Synch, heifers detected in estrus were AI, and those not AI by d 10 were timed AI and received the final injection of GNRH of the Co-Synch. Ovaries were scanned by ultrasound on d 0, 2, 5, and daily from d 7 to 14. Blood samples collected on d 0, 2, 7, 9, and 16 were analyzed for P4. Pregnancy was diagnosed at 29 d after AI. Data was analyzed using GLM and CHISQ procedures of SAS. Greater proportion of heifers presynchronized ovulated in response to the GnRH injection given on d 0 (NPRES = 30.7 vs. PRES = 54.0%, P = 0.004). Presynchronization did not affect P4 concentration on d 0 (P = 0.80), but tended to affect it on d 2 (NPRES = 4.5 ± 0.3 vs. PRES = 5.4 ± 0.3 ng/mL; P = 0.06). Treatment with PGF2a on d 0 affected (P < 0.001) P4 concentration on d 2 (NPGF = 6.4 ± 0.3 vs. PGF = 3.5 ± 0.3 ng/mL) and 7 (NPGF = 2.7 ± 0.2 vs. PGF = 1.4 ± 0.2 ng/mL). Size of the ovulatory follicle on d 7 was not affected (P = 0.50) by pre-synchronization treatment, but it was affected by treatment with PGF2a on d 0 (NPGF = 13.5 ± 0.3 vs. PGF = 15.0 ± 0.3 mm; P = 0.001). Treatment with PGF2a on d 0 affected interval from CIDR removal to ovulation (NPGF = 3.7 ± 0.1 vs. PGF = 3.4 ± 0.1 d; P = 0.004). Presynchronization treatment did not affect P4 concentration on d 16 (P = 0.60), but heifers that received a PGF2a injection on d 0 had greater P4 concentration on d 16 (NPGF = 2.8 ± 0.2 vs. PGF = 3.5 ± 0.2 ng/mL; P = 0.002). Pregnancy rate was not affected by presynchronization treatment (P = 0.85) or treatment with PGF2a on d 0 (P = 0.99).

Key Words: Heifers, Ovulation

206 The effect of postpartum anovulatory interval on first service conception rate in crossbred dairy cattle. L. R. McNaughton*, K. M. Sanders, G. E. Stanley, and R. J. Spelman, *Livestock Improvement Corporation Ltd.*, *Hamilton, Waikato, New Zealand*.

To maintain profitability and sustainability it is important to achieve a consistently high reproductive performance in the seasonal, pastoral-based dairy production systems found in New Zealand. An extended postpartum anovulatory interval (PPAI) is considered to be a major cause of infertility. Short PPAI allow more cycles prior to mating,

which can improve fertility, whilst animals with long PPAI may be anestrus when the mating period begins. This study investigates the incidence of extended PPAI and the relationship between the length of PPAI and reproductive performance in a herd of F2 Friesian x Jersey dairy cattle. Animals were the daughters of six crossbred sires and born in 2000 and 2001. The data includes lactation one and two of all animals and lactation three of the 2000 born animals. Calving began in mid-July and mating began in mid-October each year. Progesterone concentrations were measured 2x per week. The incidence of extended PPAI (not ovulated within 42 days postpartum) was 45.7, 9.7 and 4.4% in first, second and third lactation (significant effect of age, $p<0.01$). First service conception rates were not different between animals with normal vs. extended PPAI. The length of the PPAI (split into 6 categories;see table) did not affect first service conception rates. This was despite the interval from ovulation to first service being longer in animals with short PPAI, enabling more cycles prior to first service, which has previously been reported to be associated with better fertility. First service conception rate was not related to the length of the PPAI in this population.

Table 1. The effect of postpartum anovulatory interval on the interval from first ovulation to artificial insemination an first service conception rate

PPAI (days)	n	PPAI-AI (days ± se)	first service conception rate
≤16	311	62.4 ± 1.1^{a}	0.65^{ab}
17-20	298	55.6 ± 1.1^{b}	0.68^{a}
21-26	271	50.4 ± 1.2^{c}	0.63^{ab}
27-34	266	45.0 ± 1.2^{d}	0.56^{b}
35-50	305	35.6 ± 1.2^{e}	0.66^{ab}
>50	270	18.5 ± 1.3^{f}	0.61^{ab}

Different superscripts within a column indicate significant differences ($p<0.05$)

Key Words: Fertility, Postpartum anovulatory interval, Conception rate

207 Effects of source of supplemental Se and method of presynchronization on reproduction and lactation of dairy cows. H. M. Rutigliano*[1], F. S. Lima[1], R. L. A. Cerri[1], L. F. Greco[1], J. M. Vilela[1], V. Magalhaes[1], J. Hillegass[1], W. W. Thatcher[2], and J. E. P. Santos[1], [1]*University of California Davis*, *Tulare*, [2]*University of Florida*, *Gainesville*.

Objectives were to determine the effect of source of supplemental Se and method of presynchronization on pregnancy rates and lactation performance of dairy cows. Holstein cows, 577, were enrolled in a 2x2 factorial design. Treatments were sodium selenite (SS) or Se yeast (SY, Sel-Plex™) supplemented at 0.3 ppm from 25 d prior to calving to 80 d in milk, and two methods of presynchronization, Presynch (2 PGF2a given 14 d apart) or CIDR inserted for 7 d with an injection of PGF2a at removal. Cows were AI following the Ovsynch protocol starting at 12 or 3 d after the presynchronization for Presynch and CIDR, respectively. Body condition was scored at study enrollment. Lactation performance was followed for the first 80 d postpartum. Cows were diagnosed for pregnancy at 28, 42 and 56 d after AI. Cows receiving SY produced (kg/d) more ($P<0.05$) 3.5% FCM (40.4 vs 38.5) and milk fat (1.42 vs 1.35) than SS, but yields of milk (41.1 vs 40.1) and true protein (1.14 vs 1.12), and SCC (120 vs 132 x 1000/mL) were all similar ($P>0.10$) between treatments. Body condition score was similar ($P=0.45$) for SY and SS throughout the study and averaged 3.08 and 3.07, respectively. Source of Se did not ($P=0.23$) influence cyclicity, but fewer ($P=0.02$) CIDR than Presynch cows were cyclic at the beginning of the Ovsynch (78.0 vs 86.1). Ovulatory responses were not influenced by source of Se. However, Presynch increased ($P<0.01$) ovulation to the first GnRH (73.5 vs 58.7), and size of ovulatory follicle at PGF (16.0 vs 15.2mm) and final GnRH (19.0 vs 18.2mm) of the Ovsynch, but did not influence ovulation at the final GnRH of the Ovsynch. Pregnancy on d 28 after first AI was not influenced ($P>0.15$) by source of Se (SY=31.2 vs SS=34.4%) or method of presynchronization (CIDR=33.0 vs Presynch=33.3%). Similarly, pregnancy loss from 28 to 56 d of gestation was not influenced ($P>0.15$) by Se (SY=23.5 vs SS=20.5%) or method of presynchronization (CIDR=22.5 vs Presynch=21.3%). SY improved lactation performance, but neither source of Se nor method of presynchronization altered pregnancy rates and embryonic survival in dairy cows.

Key Words: Selenium, Presynchronization, Dairy cow

208 Effects of presynchronization with GnRH on conception rates and ovarian events in *Bos indicus*-influenced females synchronized with CO-Synch + CIDR. J. F. Zuluaga*[1], J. P. Saldarriaga[1], D. A. Cooper[1], J. A. Cartmill[1], R. L. Stanko[1,2], and G. L. Williams[1], [1]*Texas A&M University Agricultural Research Station*, *Beeville*, [2]*Texas A&M University*, *Kingsville*.

Objectives were to evaluate the effect of presynchronization with GnRH on conception rates (CR, Exp.1) and ovarian events (Exp.2) in *Bos indicus*-influenced females synchronized with the CO-Synch + CIDR (CSC) protocol. In Exp.1, 135 Brahman x Hereford (F1) females were stratified by BW, BCS, age, and d postpartum (dpp) and assigned randomly to 1) Presynch; presynchronization followed by CSC or 2) CSC only. On d -7, cattle received either 100 µg GnRH (GnRHpre) or 2 mL saline i.m. The CSC protocol included an Eazy-Breed CIDR and i.m. injection of GnRH (GnRH-1) on d 0, removal of CIDR and i.m. injection of 25 mg PGF2α on d 7, and i.m. injection of GnRH (GnRH-2) and timed AI (TAI) 66 h after CIDR removal (d 10). Mean (± SEM) age, BCS, BW and dpp were 6.1 ± 0.4 yr, 5.4 ± 0.1, 498 ± 8.7 kg, and 77 ± 1.8 d, respectively. Conception rates for Presynch (37 ± 6 %) and CSC (49 ± 6.1 %) did not differ. Deleting data from females with BCS < 5 (n = 18) increased TAI conception rates to 38 ± 6.3 % and 54 ± 6.7 %, respectively (Presynch vs CSC; P = 0.085). In Exp.2, non-cycling (46 %) and cycling (54 %) Brahman x Hereford (F1) cows (n = 98) were stratified as described previously and assigned randomly to Presynch or CSC. Ultrasonography and serum progesterone were utilized to monitor ovarian events. Mean age, BCS, BW and dpp were similar to Exp. 1. Ovulatory response and synchronized follicular wave emergence (SFWE) after GnRHpre were 50 ± 7.1 % and 84 ± 5.2 %, respectively. Ovulatory responses after GnRH-1 differed (P < 0.01) between Presynch (58 ± 7.1 %) and CSC (27 ± 6.5 %) but treatment did not affect SFWE after GnRH-1 (86 ± 3.6 %), ovulation after GnRH-2 (74 ± 4.4%), follicular size, or TAI CR (31 ± 4.7 %). Presynch improved ovulation rate after GnRH-1, but did not increase CR compared to CSC.

Supported by TAES and Pfizer Animal Health

Key Words: Timed AI, Bos indicus, CIDR

209 Effects of ovulation rate and fetal number on fertility in twin-producing cattle. S. Echternkamp*, R. Cushman, and M. Allan, *USDA, ARS, US Meat Animal Research Center*, *Clay Center, NE*.

Effects of ovulation rate (number of corpora lutea; OR) and of fetal number and distribution within the uterus on pregnancy rate (PR) and fetal survival were evaluated from 1994 to 2004 in heifers (n = 1230) and cows (n = 3104) selected for twin births. Cattle were distributed equally between a spring (70 d) and fall (60 d) breeding season and bred by a combination of AI and natural service. Ovulation rate, PR, and fetal number and distribution were determined by real-time ultrasonography (US) of the uterus and both ovaries at 35 to 70 d post-breeding; PR was confirmed by rectal palpation at 75 to 135 d. For cows and heifers combined, OR increased ($P < 0.01$) from 1.46 in 1994 to 1.89 in 2004; number of calves/parturition increased from 1.34 to 1.56, respectively. Pregnancy rates at US and palpation diagnosis and at term for females with one (89.1, 85.1, and 85.1%, respectively), two (91.2, 86.5, and 82.7%), or three (91.5, 75.8, and 63.0%) ovulations were not affected by OR at US but PR decreased ($P < 0.01$) at calving with increasing OR. Cows with single ovulations had similar PR between seasons, but cows with twin or triplet ovulations had lower PR in the fall (OR x season; $P < 0.05$). Also, PR increased ($P < 0.01$) with postpartum interval but was decreased ($P < 0.01$) for dams with twin versus single calves. For females diagnosed with one, two, or three fetuses at US, calving rate was 95.7%, 87.8%, and 54.9%, respectively, and differed ($P < 0.01$) among fetal groups. In addition, fetal survival was reduced ($P < 0.01$) for unilateral versus bilateral twins or triplets in heifers but did not differ in cows. Calf survival at birth was 97.2% for singles, 92.0% for bilateral twins, 83.2% for unilateral twins, 73.8% for bilateral triplets, and 51.9% for unilateral triplets and differed ($P < 0.01$) among single, bilateral twin, unilateral twin, and triplet births. Thus, increased calf production from increased OR in beef cattle is tempered by increased fetal and calf mortality, especially in heifers.

Key Words: Cattle, Twins, Fertility

210 Factors affecting ovulatory follicle size and ovulation success to GnRH-induced ovulation in postpartum beef cows. J. A. Atkins*[1], T. W. Geary[2], K. J. Wells[3], M. C. Lucy[1], and M. F. Smith[1], [1]*University of Missouri*, *Columbia*, [2]*USDA ARS Fort Keogh*, *Miles City, MT*, [3]*Washington State University*, *Pullman*.

Optimizing pregnancy rates following fixed-time AI is dependent on reducing the proportion of cows with small dominant follicles that are physiologically immature at GnRH-induced ovulation and AI. A likely explanation for the presence of small dominant follicles at insemination is failure of the previous dominant follicle to ovulate in response to the first GnRH injection and thereby synchronize a follicular wave. In the present study, the effects of day of the estrous cycle and ovulatory response at the first GnRH injection on size of the dominant follicle at the second GnRH were examined in multi-parous lactating beef cows (n = 60). GnRH was administered on day -9 (GnRH1), prostaglandin $F_{2\alpha}$ on day -2, and GnRH on day 0 (GnRH2). Cows were classified into groups based on day of the estrous cycle (Day 2, 5, 9, 13, or 18; Day 0 = estrus) at GnRH1. With the exception of cows in the Day 2 group (0%; $P < 0.05$), the proportion ovulating to GnRH1 (63%) did not differ ($P > 0.10$) by day of the estrous cycle. Neither day of the estrous cycle nor ovulatory response at GnRH1 affected ($P > 0.10$) size of the dominant follicle or proportion ovulating at GnRH2. Cows that ovulated a follicle ≥ 13 mm had a greater rate of increase in progesterone (P_4) following ovulation (d2-d12) than cows that ovulated 11-12 mm ($P < 0.05$) follicles or ≤ 10 mm follicles ($P < 0.01$). Cows that displayed estrus within 12 hours of GnRH2 had a greater rate of increase in P_4 (d2-12) than cows that did not exhibit estrus ($P < 0.01$). In summary, ovulation at GnRH1 did not affect follicle size or proportion ovulating at GnRH2. In cows that ovulated at GnRH2, those that ovulated a follicle ≥ 13 mm and(or) expressed estrus had a more rapid rise in P_4 compared to cows that ovulated smaller follicles or did not display estrous behavior.

Key Words: Ovulation, Follicle size, Estrus synchronization

211 Progesterone concentrations after the first GnRH injection in a GnRH-based estrus synchronization protocol and AI pregnancy rates in primiparous cows exposed to bulls. J. G. Berardinelli* and S. A. Tauck, *Montana State University*, *Bozeman*.

The objectives were to evaluate whether exposing primiparous beef cows to the biostimulatory effect of bulls alters progesterone (P4) concentrations after the first GnRH injection; and, examine the relationship between P4 concentrations after the first GnRH injection and AI pregnancy rates in an estrus synchronization (ES) protocol that included GnRH, $PGF_{2\alpha}$ (PG), GnRH and fixed-time AI (TAI). Three experiments were conducted over consecutive yr. In each yr cows were exposed (BE; n=94) or not exposed (NE; n=67) to the biostimulatory effect of bulls for at least 55 d before the start of the ES protocol which included GnRH (d -10) followed by PG 7 d later (d -3). Cows that showed estrus were AI 12 h later. Cows that failed to show estrus were given GnRH and TAI at ~68 h (d 0) after PG. Blood samples were collected from each cow on d -10, -7, -6, -5, -4, -1, and 0. Pregnancy rates were determined 35 d after TAI. Year or its interaction with other independent variables did not affect response variables. There was an interaction ($P < 0.05$) between treatment and sampling d for P4 concentrations due primarily to a more rapid increase in P4 concentrations between d -7 and -4 after GnRH in BE cows than in NE cows. More ($P < 0.001$) BE cows were cycling at the start of the ES protocol than NE cows. Pregnancy rate for BE cows bred at TAI was greater ($P < 0.001$) than that for NE cows. Pregnancy rate for cows bred by AI 12 h after estrus did not differ between BE and NE cows. Probability of pregnancy to AI was more likely ($P < 0.001$) to occur if P4 exceeded 1 ng/mL between d -7 and -4 after the first GnRH injection than if P4 were ≤ 1 ng/mL between d -7 and -4 in BE and NE cows. We conclude that the biostimulatory effect of bulls alters the P4 response in an ES protocol that included GnRH, $PGF_{2\alpha}$, GnRH and TAI, and that P4 concentrations after the first GnRH injection may determine the success rate of GnRH-based ES protocols in primiparous beef cows.

Key Words: Biostimulation, Estrus synchronization, Progesterone