

Physiology and Endocrinology: Estrous Cycle Manipulation - Beef

263 Effect of 72 h temporary calf removal and/or equine chorionic gonadotropin (eCG) before timed AI on follicle development, concentrations of LH and estradiol, and ovulation rate in suckled beef cows. G. H. L. Marquezini^{*1}, V. R. G. Mercadante¹, J. S. Stevenson², G. A. Perry³, and G. C. Lamb¹, ¹North Florida Research and Education Center, University of Florida, Marianna, ²Department of Animal Sciences and Industry, Kansas State University, Manhattan, ³Department of Animal and Range Sciences, South Dakota State University, Brookings.

We hypothesized that temporary calf removal (CR) and/or eCG at CIDR removal of an ovulation synchronization protocol may improve follicle development and alter patterns of LH, estradiol (E2), and progesterone (P4) secretion. Thirty-five multiparous crossbred cows in a 4.8 (range 4 to 7) BCS, and 29.2 (range 19 to 40) d postpartum, were assigned randomly to treatments: 1) 100 µg GnRH and a CIDR insert (d -7), 25 mg PGF_{2α} (PG) and CIDR removal (d 0), and 72 h later by GnRH and AI (d 3; Control; n = 9); 2) same as Control but calves were removed from their dams for 72 h between d 0 and 3 (CR; n = 9); 3) same as Control but cows received 300 IU eCG on d 0 (eCG; n = 9); 4) same as CR but cows received 300 IU eCG on d 0 (eCGCR; n = 8). Blood samples were collected every 4 h from d 0 to 3 and once on d 10 to determine concentrations of hormones. Transrectal ultrasonography was performed on d 0, 1, 2, 3, 4, and 10 to determine follicle diameters and to confirm ovulation. Control cows had decreased ($P < 0.05$) ovulation incidence compared with COCR, eCG, and eCGCR between d 0 and 4 (22, 78, 67, and 88%, respectively), and between d 0 and 10 (67, 100, 78, 100%, respectively). The COCR and eCGCR treatments had a shorter ($P < 0.05$) interval between PG and LH peak compared with Control, whereas eCG was intermediate (72.4 ± 2.3 , 65.3 ± 2.3 , 70.2 ± 2.3 , and 66.5 ± 2.4 h, for Control, COCR, eCG, and eCGCR respectively). The COCR, eCG, and eCGCR treatments had greater ($P < 0.05$) follicle diameter on d 2 compared with Control (11.9 ± 0.7 , 14.1 ± 0.7 , 14.7 ± 0.6 , and 15.6 ± 1.0 mm, for Control, COCR, eCG, and eCGCR, respectively) and concentrations of P4 on d 10 (1.4 ± 0.4 , 2.7 ± 0.4 , 2.7 ± 0.4 , and 2.8 ± 0.4 ng/mL for Control, COCR, eCG, and eCGCR, respectively). We conclude that CR reduced the interval to the LH peak and both CR and eCG at CIDR removal enhanced follicle growth, ovulation incidence, and P4 concentrations in early postpartum suckled beef cows.

Key words: equine chorionic gonadotropin, calf removal, beef cows

264 Evidence that prostaglandin administration at the onset of a 5-day CO-Synch + CIDR synchronization protocol markedly improves fixed-time AI pregnancy rates in *Bos indicus*-influenced cattle. G. Williams^{*1,2}, R. Stanko^{1,3}, C. Allen^{1,2}, R. Cardoso^{1,2}, L. Prezotto^{1,2}, J. Thorson^{1,2}, and M. Amstalden², ¹Texas AgriLife Research, Beeville, ²Texas A&M University, College Station, ³Texas A&M University-Kingsville, Kingsville.

Protocols in the US for synchronization of ovulation and fixed-time AI (TAI) in beef cattle have emphasized recently the combined use of the controlled intravaginal drug-releasing insert (CIDR), GnRH and prostaglandin F-2α (PG) or its analogs. Together, these can be used effectively to control the corpus luteum (CL) and synchronize a new follicular wave in *Bos taurus* females. Using the 7-Day CO-Synch + CIDR (7-Day) or 5-Day CO-Synch + CIDR (5-Day) protocols, TAI pregnancy rates in *Bos taurus* beef cows often exceed 50% (7-Day), and frequently exceed 60% (5-Day). However, use of the 7-Day pro-

tol in *Bos indicus*-influenced cattle has resulted consistently in TAI pregnancy rates of <40%. Initial objectives were to determine whether the 5-Day protocol in *Bos indicus*-influenced beef cows could improve TAI pregnancy rates compared with historical rates obtained with 7-Day. In Exp. 1, 79 postpartum (PP) Braford cows at least 45 d postpartum at TAI and BCS ≥ 5 , and 21 nulliparous Braford and Brangus heifers (BCS ≥ 5), were administered the 5-Day protocol [5-Day CIDR; 2x PG (50 mg Lutalyse; Pfizer) at CIDR removal on Day 5; TAI + 100 µg GnRH 72 h later]. Pregnancy rate to TAI was not improved (cows, 30.3%; heifers, 42.9%) relative to 7-Day. In Exp. 2, we compared the standard 5-Day procedure to the 5-Day in which PGF was administered at CIDR insertion to regress mature CL (Bee Synch + CIDR; Bee Synch). *Bos indicus*-influenced beef cows (n = 150) as in Exp. 1 were stratified by days PP and assigned randomly to receive either the standard 5-Day or Bee Synch protocol. Pregnancy rate to TAI was greater ($P < 0.05$) in Bee Synch (52.4%) than in 5-Day (35.7%). In Exp. 3, 119 Braford and Brangus cows were treated with Bee Synch, with TAI at 66 h. Pregnancy rate to TAI was 52.1%. Eliminating data from a pasture containing cows (n = 37) having extreme temperaments increased pregnancy rate to 58% (n = 98). Results indicate a marked benefit of Bee Synch in *Bos indicus*-influenced cattle, with number of times through the chute remaining at 3.

Key words: 5-day CO-Synch + CIDR, prostaglandin, *Bos indicus*

265 Determination of appropriate delivery of PGF_{2α} in the 5-day Co-Synch + CIDR protocol in lactating beef cows. G. A. Bridges^{*1}, L. H. Cruppe², J. F. Currin³, M. L. Day², P. J. Gunn⁴, J. R. Jaeger⁵, G. C. Lamb⁶, A. E. Radunz⁷, P. Repenning⁸, J. S. Stevenson⁵, J. C. Whittier⁸, and W. D. Whittier³, ¹University of Minnesota, ²The Ohio State University, ³Virginia Tech, ⁴Purdue University, ⁵Kansas State University, ⁶University of Florida, Marianna, ⁷University of Wisconsin, Madison, ⁸Colorado State University.

The objective of this experiment was to determine if 2 doses of PGF_{2α} (PG) administered at CIDR removal was an efficacious method for delivery of PG in the 5-d CO-Synch + CIDR protocol. Postpartum beef cows (n = 2465; 67 ± 0.4 dpp) from 13 herds in 8 states were enrolled in the 5-d CO-Synch + CIDR protocol and assigned to receive either 2 doses of PG (25 mg/dose) 8 h apart with the initial injection given at CIDR removal (8hPG), 2 doses (25 mg/dose) of PG delivered in 2 injection sites with both administered at CIDR removal (CoPG), or a single 25-mg dose of PG at CIDR removal (1xPG). Cows were TAI 72 h after CIDR removal at second GnRH administration. Estrous cycling status (54% cyclic) was determined by evaluation of progesterone in 2 blood samples taken on d -10 and 0 relative to CIDR insertion. Determination of pregnancy was performed by transrectal ultrasonography 39 ± 0.1 d after TAI and after the conclusion of the breeding season. Data were analyzed with the Glimmix procedure of SAS, where herd was included as a random effect. Timed AI pregnancy rates were greater ($P < 0.05$) for the 8hPG (55%) than the 1xPG (48%) treatment, with the CoPG (51%) treatment intermediate and not different from the other treatments. Contrast analysis demonstrated that cows receiving 50 mg of PG (8hPG and CoPG) had greater ($P < 0.05$) TAI pregnancy rates than those receiving 25 mg (1xPG). Pregnancy rates to TAI were greater ($P < 0.05$) in cyclic (55%) than non-cyclic (47%) and greater ($P < 0.05$) in mature (≥ 3 y of age; 54%; n = 1940) than 2-y-old cows (40%; n = 525). Luteolysis following PGF treatment was assessed in a subset of cows (n = 277) and did not differ ($P = 0.13$)

among the 8hPG (96%), CoPG (93%), and 1xPG (88%) treatments. Breeding season pregnancy rates (88%) did not differ among treatments but was greater ($P < 0.01$) in mature (90.4%) than 2-y-old cows (77.7%). In summary, 50 mg of PG was required in the 5 d CO-Synch + CIDR protocol; however, TAI pregnancy rates did not differ when 50 mg of PG was administered simultaneously with CIDR removal or at 0 and 8 h following CIDR removal.

Key words: beef cow, estrus synchronization, prostaglandin

266 Comparison of long-term progestin-based protocols to synchronize estrus and ovulation prior to fixed-time AI in postpartum beef cows. J. M. Nash*, D. A. Mallory, C. C. Selby, T. M. Taxis, M. R. Ellersieck, S. E. Poock, M. F. Smith, and D. J. Patterson, *University of Missouri, Columbia*.

We compared follicular dynamics, ovulatory response to GnRH, steroid hormone concentration patterns, and synchrony of estrus and ovulation among estrous-cycling and anestrus postpartum beef cows after treatment with 2 long-term progestin-based protocols. Beef cows ($n = 38$) were assigned to treatments based on age, days postpartum (DPP), BCS and estrous cyclicity status. CIDR Select (T1, $n = 19$) treated cows received a controlled internal drug release insert (CIDR; 1.38 g of progesterone) from d 0 to 14 followed by GnRH (100 μg , i.m.) on d 23, and prostaglandin $F_{2\alpha}$ (PG; 25 mg, i.m.) on d 30. Cows assigned to the Show-Me-Synch (T2, $n = 19$) treatment received a CIDR insert from d 0 to 14 and PG on d 30. Blood samples were taken on d -8 and 0 of treatment to determine estrous cyclicity status (progesterone ≥ 0.5 ng/mL). HeatWatch estrus detection transmitters were fitted one day before CIDR removal for continuous estrus detection. 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 GnRH, PG and AI; and pregnancy diagnoses. AI was performed 72 h after PG for cows in each treatment and all cows were administered GnRH at AI. Follicle turnover on d 25 was higher among T1 than T2 treated cows ($P < 0.001$); however, progesterone at PG did not differ between treatments ($P = 0.64$). Mean dominant follicle diameter at GnRH and AI did not differ between treatments ($P > 0.05$), but T2 treated cows had larger follicles at PG than cows in T1 ($P = 0.06$). Estrous response after CIDR removal and PG did not differ between treatments; and variances for interval to estrus after CIDR removal and PG were similar for both treatments. T2 treated cows had higher pregnancy rates resulting from FTAI and final pregnancy rates than T1 treated cows ($P = 0.05$). In summary, future studies are needed to further evaluate long-term progestin based protocols in postpartum beef cows. This project was supported by National Research Initiative Competitive Grant no. 2005-55203-15750 from the USDA National Institute of Food and Agriculture.

Key words: fixed-time AI, beef cow, CIDR

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

This experiment compared pregnancy rates in postpartum beef cows resulting from fixed-time AI (FTAI) after treatment with controlled internal drug release (CIDR)-based protocols to synchronize estrus and ovulation. Angus cows were assigned to one of 2 treatments by age, days postpartum (DPP) and BCS. Cows assigned to the 14-d CIDR-PG

(Show-Me-Synch; T1, $n = 167$) treatment received CIDR inserts (1.38 g of progesterone) from d 0 through 14 followed by administration of prostaglandin $F_{2\alpha}$ (PG, 25 mg, i.m.) on d 30. Cows assigned to the 7-d CO-Synch + CIDR treatment (T2, $n = 177$) 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 -10 and 0 of treatment to determine pretreatment estrous cyclicity status of cows (progesterone ≥ 0.5 ng/mL estrous cycling; T1, 97/167 = 58%; T2, 96/177 = 54%). Continuous estrus detection was performed using HeatWatch beginning at PG and concluding at FTAI. AI was performed at predetermined fixed times (72 h, T1; 66 h, T2) and all cows were administered GnRH at AI. There were no differences between treatments for age, BCS, or DPP. Pregnancy rates resulting from FTAI did not differ ($P > 0.10$) between technicians; AI sires; or on the basis of pretreatment estrous cyclicity status. Pregnancy rates were greater ($P < 0.01$) among cows that exhibited estrus before FTAI than for those that did not (91/124 = 73% and 99/220 = 45%, respectively). However, anestrus cows in T1 were 2 times more likely to become pregnant to FTAI than to not become pregnant. Pregnancy rates resulting from FTAI did not differ between treatments ($P = 0.87$; T1 91/167 = 55%, T2 99/177 = 56%) and neither did final pregnancy rates ($P = 0.49$; T1 147/167 = 88%, T2 160/176 = 91%). In summary, pregnancy rates resulting from FTAI following treatment with T1 and T2 were similar among postpartum beef cows. This project was supported by National Research Initiative Competitive Grant no. 2005-55203-15750 from the USDA National Institute of Food and Agriculture.

Key words: fixed-time AI, beef cow, CIDR

897 Estrogenicity of sugar beet by-products used as animal feeds. N. W. Shappell¹, E. M. Lenneman^{1,2}, and M. S. Mostrom², ¹USDA-ARS, Fargo, ND, ²North Dakota State University, Fargo.

A veterinarian conducting embryo transfer observed reduction in transfer success rates on both a beef and dairy farm in Minnesota, which were both feeding sugar beet by-products. Beet tailings and pelletized post-extraction beet pulp purchased commercially were submitted for analysis of estrogenicity by E-Screen (proliferative assessment of non-transfected MCF-7 BOS cells). Samples were found to be estrogenic, with pelletized sample containing ~4 fold the estradiol equivalents of the unprocessed sample (3.8 and 1.2 E²Eq $\mu\text{g}/\text{kg}$ DM, respectively). Samples of whole beets, beet pellets and shreds were then obtained from several Midwest US locations, dried, extracted, and assessed for estrogenicity. All pellets examined were found to be estrogenic, with a wide range of concentrations (0.1 - 2.0 μg E²Eq/kg dry matter) a mean of 0.46 μg , and median of 0.28 μg ($n = 9$). Relative E²Eq for the other sample types ranked as follows: pellets > shreds ($n = 3$) > most unprocessed plant material ($n = 7$). These by-products are sold both within the United States and abroad, and are used as feed predominantly for cattle (both beef and dairy), but also for horses and elk. Using the recommended feeding regimen guidelines for these feedstuff cattle could consume 0.3 to 6.8 μg E²Eq per day, however, these guidelines are often exceeded for financial reasons. Calculating possible blood concentrations from consumption of by-product containing 5 μg E²Eq, a conservative estimate of 10% absorption, and 500 kg body weight, the resultant 12.5 pg/mL E²Eq is similar to the 10 pg/mL estradiol typical of cows during estrus.

Key words: MCF-7, estrogenicity, fertility

268 Effect of length of the preovulatory period on estradiol, progesterone, ISG-15 and Mx2 in cows. L. H. Cruppe^{*1}, L. A. Souto¹, M. Maquivar¹, F. M. Abreu¹, M. L. Mussard¹, T. L. Ott², J. L. Pate², and M. L. Day¹, ¹The Ohio State University, Columbus, ²The Penn State University, State College.

Postpartum primiparous beef cows (n = 23) were used to investigate the effect of preovulatory estradiol concentrations (Pre-E2) on ISG-15 and Mx2 mRNA expression in peripheral blood mononuclear cells (PBMC) from d 15 to 30 after ovulation. Estrus was synchronized, follicular aspiration was performed 5.5 ± 0.1 d later (d -7 of experiment) and cows received 25 mg PGF_{2α} on either d -3 (high estradiol treatment; Hi-E), or on d -2 (low estradiol treatment; Lo-E). All cows received 100 µg of GnRH on d 0, creating a preovulatory period of either 3 or 2 d. Ultrasonography was performed on d -7, -3, 0, 2 and 6 to monitor follicular growth, ovulation and CL formation after GnRH. Blood samples collected at 12 h intervals from d -3 to d -0.5 and at d -0.25 and d 0 were used to determine Pre-E2. Blood samples collected every other day from d -3 to 13 were analyzed for progesterone (P4). Daily samples, collected from d 14 to 30, were processed for both P4 and mRNA analysis in PBMC. Embryos were implanted into cows in the Hi-E (Hi-E-ET, n = 6) and Lo-E (Lo-E-ET, n = 9). Cyclic control animals did not receive embryos (Hi-E-0, n = 4; Lo-E-0, n = 4). Gene expression was determined using RT-PCR for ISG-15 and Mx2. Diameter of the ovulatory follicle (13.4 ± 1.1 mm) did not differ between treatments. While Pre-E2 were greater (P < 0.05) in the Hi-E than Lo-E on d -2.5 and -2, they did not differ thereafter, and appeared to peak and then decline in most animals before GnRH. Furthermore, luteal P4 did not differ between Hi-E and Lo-E. Relative amount of mRNA did not differ between the Hi-E and Lo-E, but was greater in pregnant than cyclic cows for both ISG-15 and Mx2 after d 18 through d 30. A biphasic pattern of gene expression was observed for both ISG-15 and Mx2, where maximum amounts of gene expression in pregnant cows was detected by d 20 followed by a decrease, increase and finally a second decrease to d 30. In conclusion, decreasing the length of the preovulatory period appeared not to limit Pre-E2 in this study. Greater amounts of mRNA for ISG-15 and Mx2 were detected in pregnant cows after d 18 and followed a biphasic pattern thereafter to d 30

Key words: estradiol, ISG-15, Mx2

269 Effect of follicle age on conception rate in beef heifers. F. M. Abreu^{*1,2}, L. H. Cruppe¹, M. Maquivar¹, M. D. Utt¹, C. A. Roberts², M. L. Mussard¹, M. L. Day¹, and T. W. Geary², ¹The Ohio State University, Columbus, ²USDA-ARS Fort Keogh LARRL, Miles City, MT.

The objective of this study was to determine the effect of age of the ovulatory follicle on fertility. Ovulation (d 0) was synchronized in post pubertal heifers in Montana (n = 153; MT) and Ohio (n = 152). All heifers received estradiol benzoate (EB; 1mg/500kg BW) on d 6 and were assigned to either receive PGF (25 mg, i.m.) 5 d (d 11 of the experiment; "young" follicle, YF, n = 154) or 9 d (d 15 of the experiment; "mature" follicle, MF, n = 151) after EB. Estrus was detected for 5 d after PGF with AI approximately 12 h after estrus. Ovarian ultrasonography (MT only) was performed on d 6, 11, 15 (MF only) and at AI. Heifers that failed to initiate a new follicular wave after EB (MT only) were excluded from further analyses (n = 11). Heifers from the MF treatment in MT that initiated a second follicular wave after EB, but before PGF on d 15 (n = 14, MF2) remained in the analyses. Estrous response and conception rate were analyzed using a model that included location, treatment, and their interaction, with the GLIMMIX procedure of SAS. Interval from PGF to estrus was analyzed with the

MIXED procedure of SAS. In a second analysis, heifers with 2 follicular waves after EB (MF2) were compared with the MF heifers with one wave, and the YF treatment in MT. Interval from PGF to estrus was similar between treatments in MT (65.5 ± 1.6) but was greater (P < 0.05) in the YF (78.5 ± 1.4) than MF (53.6 ± 2.2) treatment in OH (trt x loc, P < 0.01). Estrous response (89%) and conception rate did not differ (P > 0.10) for MF (64.1%) and YF (67.2%) heifers. The MF2 heifers in MT had a greater (P < 0.01) interval to estrus and smaller (P < 0.01) ovulatory follicles at AI than MF heifers with a single follicular wave after EB. When MF2 heifers were removed from analyses, interval from PGF to estrus in MT was greater (P < 0.01) but follicle diameter was smaller (P = 0.01) in YF than MF heifers. Furthermore, this interval was similar for MF heifers between locations (54.6 ± 1.7), but was greater (P < 0.01) for YF heifers in OH (78.5 ± 1.4) than MT (67.4 ± 1.5). In conclusion, manipulation of age of the ovulatory follicle at spontaneous ovulation did not influence conception rate.

Key words: follicle age, heifers, conception rate

270 Effect of various doses of prostaglandin F_{2α} on estrous behavior and blood progesterone in beef cows. A. Ahmadzadeh^{*}, K. Carnahan, T. Robison, and C. Autran, University of Idaho, Moscow.

Research indicates that 2 doses of prostaglandin F_{2α} (PGF), rather than one dose of PGF increased pregnancy rates when utilized with a 5-d CO-Synch + CIDR protocol. The objectives were to determine the effect of 3 PGF treatment protocols on estrual behavior and serum progesterone (P4) concentrations of suckled beef cows synchronized with a modified 5-d CO-Synch + CIDR protocol. The experiment was conducted over 2 consecutive breeding seasons. Ninety-seven Charolais cows received a CIDR (d 0) for 5 d. On d 5 CIDR's were removed, and cows were assigned randomly to receive one of 3 treatments; 1) Control; a single injection of 25 mg PGF (dinoprost tromethamine; n = 32), 2) Large; a single injection of 37.5 mg PGF (n = 32), or 3) Split; 2 injections of 12.5 mg PGF 7 h apart (n = 33). All cows were fitted with estrus detection aids, observed for behavioral estrus at least 3 times daily, and inseminated according to the am- pm rule after detected in estrus. Animals that were not detected in estrus received 100 µg GnRH and timed AI 96 h after PGF injection. Blood was collected on d 0 and d 7 (56 h after PGF treatment) to measure P4 concentrations. There was no effect of treatment by year interaction on any dependent variable. Mean P4 concentration on d 0 was not different between treatments. At 56 h post-PGF treatment, mean P4 concentrations were < 1 ng/mL for all groups and were not different between treatments. The mean interval from PGF treatment to detected estrus was different (P < 0.05) among treatments: Control = 60.5 ± 3.4 h, Large = 64.0 ± 2.8 h and Split = 52.8 ± 2.8 h. The proportion of cows detected in estrus was different between treatments (P < 0.05) and were 65.6, 84.4, and, 90.5%, for Control, Large, and Split groups, respectively. These results indicate that either 2 injections of 12.5 mg PGF 7 h apart or a single injection of 37.5 mg PGF effectively causes luteolysis 56 h post PGF treatment. However, the split dose of 2 injections of 12.5 mg PGF 7 h apart shortened the intervals from treatment to estrus, and increased proportion of cows detected in estrus.

Key words: beef cows, prostaglandin F_{2α}, estrus

271 The use of ruminal temperature for the prediction of estrus in beef cows. B. H. Boehmer^{*}, T. A. Pye, and R. P. Wettemann, Oklahoma Agricultural Experiment Station, Stillwater.

Ruminal temperature (RuT) is a measure of core body temperature and can be used for identification of physiological events in beef cows. The usefulness of RuT for predicting estrus, parturition, heat stress, and animal health may be influenced by elevated ambient temperature. Ruminal temperature increases when cows are exposed to an ambient temperature greater than 32°C. The objective of this experiment was to evaluate the use of RuT to predict estrus in beef cows in June and July. Angus cows ($n = 58$) were administered ruminal temperature boluses (SmartStock, LLC.) which were programmed to transmit every hour. Cows were synchronized with PGF_{2α} at 60 to 90 d postpartum. Onset of estrus was determined as an increase of 0.7°C in RuT during 8 h compared with the preceding 72 h. Cows were artificially inseminated 8 to 16 h after estrus was determined by RuT. Progesterone was quantified daily in plasma samples and onset of estrus was recorded by HeatWatch (CowChips, LLC.). Ambient temperature was recorded hourly (www.mesonet.org). Ruminal temperature was evaluated using the MIXED procedure (SAS). Maximum daily ambient temperature was $27.5 \pm 3.9^\circ\text{C}$ (range 19 to 35°C). Mean RuT for all cows was $38.5 \pm 0.8^\circ\text{C}$. Ruminal temperature was greater ($P < 0.05$) during the 8 h at the onset of estrus when determined by RuT or HeatWatch ($39.2 \pm 0.1^\circ\text{C}$, $38.8 \pm 0.1^\circ\text{C}$, respectively) compared with the same daily hours the day before ($38.5 \pm 0.1^\circ\text{C}$, $38.4 \pm 0.1^\circ\text{C}$) or after ($38.7 \pm 0.1^\circ\text{C}$, $38.4 \pm 0.1^\circ\text{C}$) onset of estrus. Ruminal temperature correctly identified estrus in 33 of 58 cows as determined by HeatWatch. Ruminal temperature determined that the onset of estrus was within 24 h of the onset of estrus as determined by HeatWatch in 62% of the cows. Based on plasma concentrations of progesterone, RUT identified estrus in 57% of cows and 43% of non estrous cows were identified as estrus. Pregnancy rate was 40% when estrus was identified by RUT and cows were AI. Elevated ambient temperature may influence the usefulness of RuT to detect estrus in beef cows.

Key words: ruminal temperature, estrus, beef cow

272 Effect of acetylsalicylic acid on vasodilatation of uterine arteries, right external iliac arterial blood flow, and pregnancy in beef cows. H. L. Sanchez-Rodriguez*, R. C. Vann, E. Baravik-Munsell, S. T. Willard, and P. L. Ryan, *Mississippi State University, Mississippi State.*

B-mode and Duplex Doppler ultrasound were used to determine the effects of acetylsalicylic acid (ASA) on uterine arteries diameter, external iliac artery Resistance Index (RI), and subsequent pregnancy rate in open, cycling Angus crossbred cows [4.27 ± 1.22 yr old; 568.76 ± 46.56 kg BW (mean \pm SD)]. Acetylsalicylic acid (2,500 mg, ASA; $n = 19$) was administered twice daily in the feed from d -9.5 to 45 (d 0 = AI date). Control cows (CN; $n = 19$) received 5 g/d of dry molasses in flakes (placebo) in the feed during the same period. Dimensions of both uterine arteries were recorded once daily during d -10.5, -2.5, 0, 3, 6, 10, 16, 20, 25, 32 in a subsample of 16 cows (8/treatment). Pregnancies were confirmed at d 45 post AI. Jugular vein blood samples were collected after each ultrasound sampling for serum progesterone, and plasma prostaglandin F_{2α} and prostaglandin E₂ analyses. No difference ($P = 0.31$) in the diameter was observed between right and left side uterine arteries within a cow. In general, cows receiving ASA had larger diameter of uterine arteries than cows receiving the placebo (4.67 ± 0.04 and 4.54 ± 0.04 mm, respectively; $P = 0.01$). Uterine arterial diameters were larger in the ASA than in CN cows during sampling d -2.5 (4.61 ± 0.12 vs. 4.23 ± 0.12 mm; $P = 0.03$) and d 0 (4.52 ± 0.12 vs. 4.10 ± 0.10 mm; $P = 0.04$). During sampling d 10, ASA cows tend to have larger uterine arterial diameter values than did CN cows (4.86 ± 0.18 and 4.41 ± 0.16 mm, respectively; $P = 0.06$). Acetylsalicylic acid-treated cows achieved a pregnancy rate ($P = 0.18$) of 73.7% (14/19) in comparison with 52.6% (10/19) for CN cows. In a subsample of 12 cows (6/treatment), the RI in the right external iliac artery was recorded. The RI values were higher ($P = 0.04$) in the ASA-treated compared with the CN cows (0.78 ± 0.02 and 0.72 ± 0.02 , respectively). These preliminary findings demonstrate that treatment with acetylsalicylic acid improves uterine arterial blood perfusion in beef cows and thus, may be an economical means of enhancing reproductive efficiency in postpartum cows.

Key words: acetylsalicylic acid, beef cows, blood flow