EVALUATING THE EFFECTIVENESS OF USING THE CONTROLLED INTERNAL DRUG RELEASE (CIDR) INSERT FOR SYNCHRONIZATION OF ESTRUS AND POSTINSEMINATION PROGESTERONE THERAPY TO IMPROVE REPRODUCTIVE PERFORMANCE OF DAIRY CATTLE

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The objective of the first trial was to determine if incorporation of gonadotropin releasing hormone (GnRH) and estradiol cypionate (ECP) into the controlled internal drug release (CIDR)-prostaglandin ($PGF_{2\alpha}$) protocol would increase pregnancy rates of dairy heifers using timed artificial insemination (TAI). This study was conducted over a 6-mo period at the University of Georgia Teaching Dairy in Athens. Forty Holstein heifers with an average age of 16 mo were randomly allocated to 1 of 2 treatment groups. In treatment 1, 20 heifers were synchronized by: 50 µg GnRH (-9 d), CIDR (1.38 g progesterone, -9 d), 25 mg $PGF_{2\alpha}$ (-3 d), 1 mg ECP (-2 d),CIDR removal (-2 d), 50 µg GnRH (d 0), and TAI (0 d), (OverSynch). A second group of 20 heifers (Control) were synchronized by: CIDR (1.38 g progesterone) (-9 d), 25 mg $PGF_{2\alpha}$ (-3 d),CIDR removal (-2 d), and TAI (0 d). Upon CIDR removal, retention rates and discharges were recorded. Estrus activity was monitored using Estru$ Alerts (Universal Cooperatives, Eagan, MN) applied at d -3. Timed AI occurred 48 h after CIDR removal. Pregnancy was determined by ultrasonography at 35 d post AI. For both treatments, CIDR retention rate was 100% and vaginal discharge was minimal with no significant effect on pregnancy rate ($P > 0.05$). Pregnancy rates of heifers synchronized by OverSynch (45 %; 9/20) were similar to those in the heifers synchronized with the control protocol (55 %; 11/20) ($P > 0.05$). In the OverSynch protocol, 16 of 20 (80%) heifers had Estru$ Alerts that were all or partially rubbed while only 11 of 20 (55%) were observed in the control group. Additionally, 55% (11/20) of the Estru$ Alerts on heifers in OverSynch were completely rubbed compared with 15% (3/20) in the control. Signs of estrus synchronization through visual appraisal of Estru$ Alerts was significantly higher in the OverSynch heifers ($P < 0.05$). Although the OverSynch protocol did significantly increase estrus activity, it did not increase pregnancy rates with a TAI.

Two additional experiments were conducted to test the efficacy of using progesterone treatment post AI to decrease embryonic mortality in dairy animals and to resynchronize estrus in dairy and beef heifers. In experiment 1, all animals were synchronized utilizing a single injection of 25 mg $PGF_{2\alpha}$ and were inseminated 12 h after animals were observed in standing estrus. Cows and heifers were randomly assigned to 1) receive post AI progesterone therapy (cow n = 11; heifers n = 13) from d 14 to 21 after AI using the CIDR insert (1.38g progesterone) (treatment) or 2) receive no further treatment post AI (cows n = 5 cows; heifers n = 9) (control). This trial was split and run in the summer and winter seasons to determine progesterone variability. Supplementation of progesterone after AI had no effect on pregnancy rates in heifers or cows, regardless of season ($P > 0.05$). No animals in this experiment diagnosed pregnant at d 35 were diagnosed open on d 60; therefore, no embryonic loss occurred, regardless of treatment. Progesterone concentrations on d 21 in heifers, regardless of treatment, tended to be higher ($P = 0.06$) than those observed in cows. During both seasons, use of the CIDR maintained

progesterone concentrations from d 14 to d 21; however, there were significantly higher progesterone values throughout the winter season when compared with summer (P = 0.01).

In the last experiment, beef (n=12) and dairy (n=32) heifers were initially synchronized utilizing a new CIDR insert (1.38 g progesterone) (d -10) with a 5 cc injection of $PGF_{2\alpha}$ at the time of CIDR removal (d -3). Animals were then artificially inseminated at 12 h after detected estrus (d 0). At 14 d post insemination (d 14), all animals received the same previously inserted CIDR for a second 7-d period until removal on d 21, followed by reinsemination occurring 12 h after detected estrus.

Pregnancy rate response to initial synchronization (Figure 3.3) was higher in both dairy (52.17%; 12/23) and beef (75%; 3/4) heifers compared with resynchronization, which yielded pregnancy rates of 40% (4/10) and 50% (3/6), respectively. Use of the new CIDR insert significantly increased (P = 0.002) progesterone concentrations from d -10 to d -3 in heifers, whereas the used CIDR did not increase progesterone concentrations from d 14 to d 21 (P > 0.05). A mean increase in progesterone concentrations from d 14 to d 21 was a significant positive predictor of pregnancy (P = 0.0133). Furthermore, on d 21, progesterone concentrations were positively correlated with incidence of pregnancy at d 35 (P = 0.004). The use of exogenous progesterone maintains circulating blood progesterone concentrations in heat stressed heifers and non heat stressed heifers and cows. Although a used CIDR does not appear to maintain progesterone concentrations similar to those with a new CIDR, it did successfully suppress and resynchronize return to estrus.

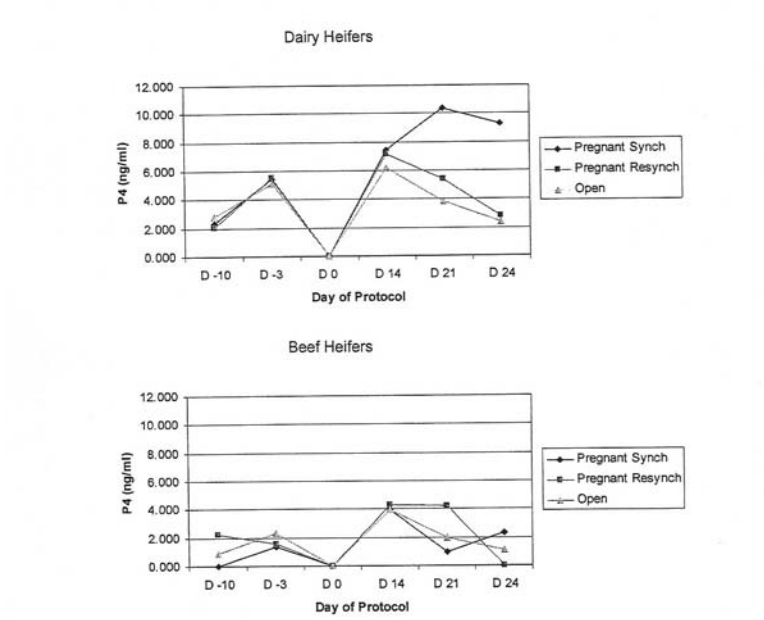

Figure 3.3: Representation of progesterone concentrations between dairy and beef heifers on test dates of protocol based on d 35 pregnancy diagnosis. It is evident that pregnancy in both beef and dairy heifers alters the concentration of progesterone production, however, the degrees of these alterations are different.