Estrous Synchronization Protocals

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One of the most efficient ways to improve cowherd genetics is using superior sires through artificial insemination (AI) combined with estrous synchronization. In cattle of *Bos taurus* breeding, acceptable and somewhat predictable pregnancy rates can be achieved in both lactating cows and yearling heifers. However, similar results are difficult to obtain in cattle of *Bos indicus* breeding. Reasons for the below average results are unclear but appear to be associated with a decreased estrous expression, increased variation in follicle wave development, and quite possibly the way cattle of *Bos indicus* breeding respond to synchronization products.

There are three different products that are label approved by the Food and Drug Administration (FDA) that can be used for estrous synchronization in beef cattle. These include gonadotropin releasing hormone (GnRH; ie., Cystorelin, Fertagyl, Factral; $2.50 to $3.50/dose), which functions to ovulate follicles either in conjunction with a timed-AI or to initiate follicle turnover at the start of a synchronization program; prostaglandin $F_{2\alpha}$ (PG; i.e., Lutalyse, Estrumate, Prostamate, Estroplan; $2.00 to $3.50/dose), which initiates regression of the corpus luteum causing cattle to exhibit estrus; and progestogens (ie., controlled intravaginal releasing devices-CIDR, $9.00 to $12.00/ CIDR; melengestrol acetate-MGA, $0.15 to 0.40/ day), which act to prevent the expression of estrus.

One of the most common synchronization systems used in beef cattle combines an injection of GnRH followed seven days later with a PG injection. The manner in which cattle are inseminated after the base GnRH + PGF program is dictated by the management situation. Three common AI scenarios can be used: 1) AI 8 to 12 hours after an observed estrus known as the Select Sync Program; 2) timed-AI plus a GnRH injection approximately 48 to 60 hours after PG known as the Co-Synch program; and 3) a combination of estrous detection and AI for three days after PG and timed-AI plus a GnRH injection 72 to 80 hours after PG for nonresponders known as the Hybrid Sync program. All three of these systems can be effective in *Bos taurus* cattle but their effectiveness is limited in cattle of *Bos indicus* breeding. In a large research study conducted in our lab on approximately 600 cows at three ranches, synchronized AI pregnancy rates (percentage of cows pregnant to AI divided by the total treated) for the Select Sync, Co-Synch, and Hybrid Sync programs were 20, 31, and 35%, respectively. These pregnancy rates are unacceptable for an AI program.

One way to increase the effectiveness of the GnRH + PG programs is to use a progestogen in combination with the GnRH + PG treatments. The most common progestogen is the controlled intravaginal progesterone-releasing device known as the EAZI-BREED CIDR or CIDR for short. The CIDR contains 1.38 grams of progesterone and it is inserted into the vagina of the reproductive tract for seven days. Not only does the CIDR help to prime the reproductive system but it can stimulate estrus in some anestrous cattle. Most research indicates that the CIDR induces estrus in 25 to 40% of anestrous cattle. Recent research in cattle of *Bos indicus* breeding illustrates that pregnancy rates vary considerably depending on the type of AI system used. When a CIDR was used in conjunction with the Select Sync program in approximately 200 cows, both the five day estrous response (68%) and subsequent AI pregnancy rates (33%) were still very low. Subsequent research in our lab and Dr. Gary Williams lab at Texas A&M University, evaluated the Co-Synch program with timed-AI 48 hours after CIDR removal and observed AI pregnancy rates between 33 and 39% on approximately 900 cows. In conclusion, these results

indicate that neither estrus detection alone nor timed-AI alone are effective enough for getting an acceptable number of cows pregnant. Therefore, a combination of estrous detection and timed-AI may be the most effective synchronization program in cattle of *Bos indicus* breeding. Consequently, we conducted a series of experiments to evaluate the effectiveness of the Hybrid Sync plus CIDR program. Over a five year period the average AI pregnancy rate for the Hybrid Sync Program was 55% with a range of 48 to 62%. It should be noted that these studies were conducted in cows maintained on adequate nutrition before the start of the AI breeding period with an average body condition between 4 and 5 (Scale 1 to 9; 1 thin and 9 extremely fat) at the start of the AI. This point illustrates the importance of nutrition on the success of an AI and estrous synchronization program. In summary, the most effective and consistent estrous synchronization programs in lactating cows of *Bos indicus* breeding appears to be the Hybrid Sync program combined with a CIDR. Furthermore, there is no effective timed-AI only program for use in cattle of *Bos indicus* breeding that uses FDA label approved products.

The most common synchronization system used in yearling heifers combines MGA and PG. MGA is an orally active progestogen that is administered in the feed and is approved for use in lactating beef cows and yearling beef heifers. In the MGA + PG system, MGA is administered for 14 days at a rate of 0.5 mg/head/day. After MGA withdrawal, heifers exhibit estrus over a 4 to 10 day period. Heifers are not inseminated at this estrus because it is infertile. Nineteen days after the last day of MGA feeding, heifers are injected with PG and inseminated at the subsequent estrus. In a recent experiment with *Bos indicus* X *Bos taurus* heifers, we used either a single PG injection (n = 354) or two consecutive split PG injections (n = 341) starting 19 days after MGA withdrawal. Estrus was detected for three days after PG with AI 8 to12 hours later. Heifers not exhibiting estrus by the morning of the third day were timed-AI and received a GnRH injection. Heifers receiving the split PG treatment had greater three-day estrous (50.1 vs. 43.2%), timed-AI pregnancy (33.5 vs. 23.9%) and overall AI pregnancy rates (42.5 vs. 34.5%) than the single PG treatment. The reason for the increased overall AI pregnancy rate was due to an increased regression of the corpus luteum in the split PG treatment compared to the single dose PG treatment. We are currently recommending that individuals using the MGA-PG program use the split PG treatment.

There is limited research on the effectiveness of GnRH + PG synchronization programs in yearling heifers of *Bos indicus* breeding. As with lactating cows, it appears that the Hybrid Sync + CIDR program maybe the most effective synchronization system in yearling heifers of *Bos indicus* breeding. In several studies conducted in our lab during the last couple of years, AI pregnancy rates ranged from 35 to 53%. It should be noted that there is considerable variation in AI pregnancy rates in heifers because of infertile heifers that have yet to be culled and some heifers that have not reached puberty by the start of the AI breeding season.

In summary, there are estrous synchronization programs that can be used in cattle of *Bos indicus* breeding with some degree of success. Since the expression of estrus can limit the number of cattle inseminated in a synchronization program, it appears that combining estrous detection with timed-AI provides the best results in both cows and heifers. Additionally, one of the primary factors that can influence the number of cattle that become pregnant to a synchronized breeding is the percentage of cattle cycling at the start of the synchronization program, which is directly related to the nutritional program in the months prior to the start of the AI breeding.

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