REPRO TRACKS

by Cliff Lamb, Texas A&M University

Fixed-Time AI for Sexed Semen

Using presynchronization for fixed-time artificial insemination with sexed semen can enhance marketable cattle.

There are significant reproductive opportunities to enhance the value of offspring and marketable cattle. Estrus synchronization can ensure a greater percentage of calves are born early in the calving season. However, combining estrous synchronization with sexed semen adds an additional opportunity to increase the percentage of the desired sex. Recent research in this area has focused on the development of a fixed-time artificial insemination (FTAI) protocol that allows for using sexed semen.

Estrous synchronization may reduce the duration of the calving season and improve calf-crop uniformity. When combined with FTAI, estrous synchronization protocols have achieved pregnancy rates to artificial insemination (PR/AI) similar to protocols that use estrous detection. Estrous detection and its associated labor can be minimized or removed completely. Numerous estrous synchronization protocols for conventional semen are available for use in beef heifers.

A primary challenge for large-scale adoption of sex-sorted semen in the beef industry is the lower pregnancy rates typically achieved in these FTAI protocols when compared to conventional semen. To improve current PR/AI, enhanced protocols

are necessary. By making use of presynchronization in addition to an estrous synchronization strategy in beef heifers, it may be possible to improve estrous expression prior to FTAI, and as a result, improve PR/AI with sex-sorted semen. To try to develop opportunities with sex-sorted semen, researchers at Texas A&M University have focused on developing a FTAI protocol for the use of sex-sorted semen in beef heifers.

Presynchronization

Through presynchronization, it is possible to increase the proportion of females at a certain stage of the estrous cycle prior to the initiation of an estrous synchronization protocol. Consequently, the synchrony of subsequent follicular waves and estrous expression can be improved. This strategy has the potential to induce a new follicular wave and increase PR/AI.

Based on this hypothesis, an ongoing study using approximately 2,850 beef heifers from 24 locations across 11 states were enrolled in an experiment. The objective of this study was to determine if presynchronization in conjunction with delayed FTAI could reduce the current differences in fertility between conventional and sex-sorted

semen. Heifers from predominantly *Bos Taurus* breeds were assigned to multiple treatments, of which only four are highlighted in this report.

Control treatments: heifers were exposed to the 7-day CO-Synch + CIDR® protocol wherein they received an injection of gonadotropin-releasing hormone (GnRH) and a CIDR insert on day 0, an injection of PGF2α upon CIDR removal on day 7, and were FTAI 54 hours later either with conventional (CTRL-CNV) or sex-sorted semen (CTRL-SEX).

Presynchronization and delayed FTAI treatments: heifers received an injection of PGF2α 7 days prior to the initiation of the 7-day CO-Synch + CIDR protocol and had FTAI delayed to 72 hours (Figure 1). At FTAI, heifers were either inseminated with conventional (PRE72-CNV) or sex-sorted semen (PRE72-SEX). All heifers were fitted with estrous detection patches at CIDR removal, which were then evaluated for activation at FTAI to determine estrous expression.

Pregnancy rates in the CTRL-CNV treatment averaged 51.7%, whereas pregnancy rates in the CTRL-SEX treatment averaged 37.8%. When presynchronization and delayed FTAI were utilized, pregnancy rates with conventional semen averaged 53.7% (PRE72-CNV) and pregnancy rates

with sexed semen averaged 44.1% (PRE72-SEX). The difference between pregnancy rates with conventional and sex-sorted semen was reduced from 13.9% to 7.6% through the utilization of presynchronization and delayed FTAI (Figure 2).

Pregnancy rates are greater in females that express estrus prior to FTAI; therefore, further analyses were conducted to determine whether estrous detection patches could be used to target-breed heifers with sex-sorted semen based on their estrous expression prior to FTAI.

The following breeding strategy was investigated: FTAI of heifers that express estrus (using estrous detection patches) with sex-sorted semen, and FTAI of heifers that do not exhibit estrus with conventional semen, utilizing the PRE72 treatment. Of the PRE72 heifers, 65.2% exhibited estrus. According to the data, 52.2% of PRE72-SEX heifers that expressed

estrus became pregnant; therefore, 52.2% of 65.2% would result in 34.0% of the overall heifers becoming pregnant to sex-sorted semen. If the remaining heifers that did not exhibit estrus (34.8%) were FTAI with conventional semen, with expected pregnancy rates of 37.5% according to the data, then 13.1% of the overall heifers would become pregnant to conventional semen. By adding these pregnancy rates together, a total of 47.1% pregnancy success could be achieved by utilizing estrous detection patches to target breed.

Considering that sex-sorted semen

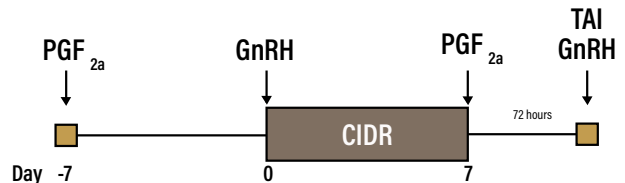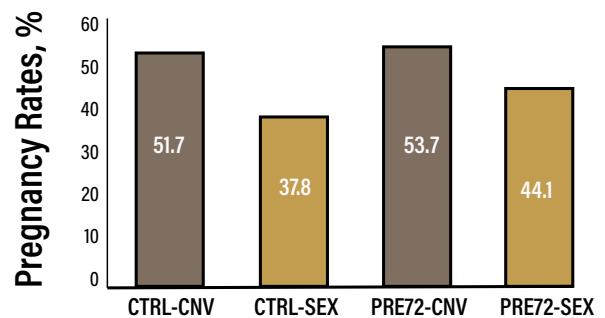**Figure 1:** *Diagram of the PRE72 FTAI Protocol*

Figure 2: *Pregnancy Rates to FTAI among treatment groups*

has an accuracy of around 90%, by target breeding according to estrus, 78.9% of the resulting calves would be of the desired sex; whereas if only sex-sorted semen was utilized, 90% of the calves would be of the desired sex. Because pregnancy rates are lower in the PRE72-SEX treatment, 3% fewer total calves would be born. By exposing the entire herd to sex-sorted semen, pregnancy rates of 44.1% may be achieved, and more calves of the desired gender can be generated.

Improvements to sperm-sexing technology are continually being made. Current pregnancy rates to FTAI with sex-sorted semen are significantly lower than that of conventional semen; however, by incorporating presynchronization in combination with delayed FTAI, the difference in pregnancy rates between conventional and sexed semen can be reduced. This estrous synchronization strategy may be used as a tool to skew the calf crop to the desired gender. **AJ**

Editor's note: Cliff Lamb is the animal science department head and a professor at Texas A&M University in College Station,