

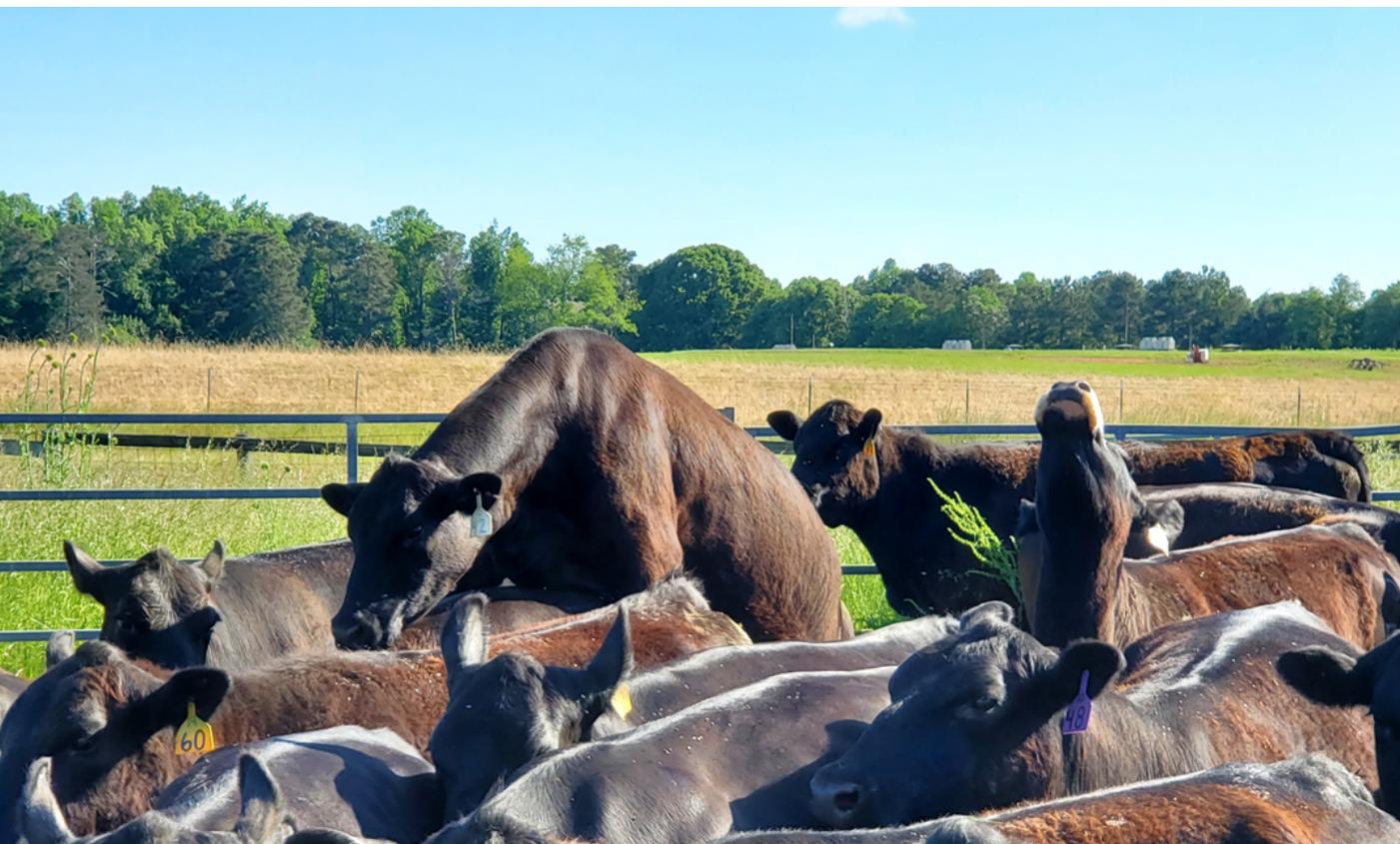
# Taking Advantage of Estrus Expression in Fixed-Time Artificial Insemination

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While estrus synchronization can eliminate the need for estrus detection, identifying females in estrus can help cattle producers further explore the benefits of technologies such as fixed-time artificial insemination and fixed-time embryo transfer. Research studies performed in different production environments have repeatedly shown that females that express estrus in response to an estrus synchronization protocol achieve greater pregnancy rates compared with females that do not express estrus. In a meta-analysis that compiled data of more than 10,000 inseminations, cows and heifers that expressed estrus prior to fixed-time artificial insemination had 27% greater pregnancy rates compared with females that did not express estrus (Richardson et al., 2016). Similar results are observed in embryo transfer settings. Embryo recipients that express estrus during the synchronization protocol are more likely to successfully establish pregnancy when compared with recipients that ovulate to the synchronization protocol but do not express estrus. Interestingly, cows that express estrus are also less likely to experience pregnancy loss between days 30 and 100 of gestation compared with cows that did not express estrus prior to fixed-time artificial insemination (Pohler et al., 2016).

Cattle producers can use estrus expression information to make breeding decisions that can maximize their return of investment, even if they are performing artificial insemination and/or embryo transfer using a fixed-time approach. In fixed-time artificial insemination settings, cattle producers can restrict the use of more valuable semen straws to females that expressed estrus and are more likely to conceive, while using less valuable semen in females that failed to express estrus. Females that do not express estrus can still become pregnant to fixed-time artificial insemination; however, because their pregnancy rates are decreased compared with females that exhibit estrus, using less valuable semen will decrease the cost per pregnancy of these females. When considering the investment made to generate embryos from a particular mating, maximizing the chances of successful pregnancy establishment is obviously beneficial. Therefore, producers should prioritize embryo recipients that express estrus when selecting recipients to receive embryos.

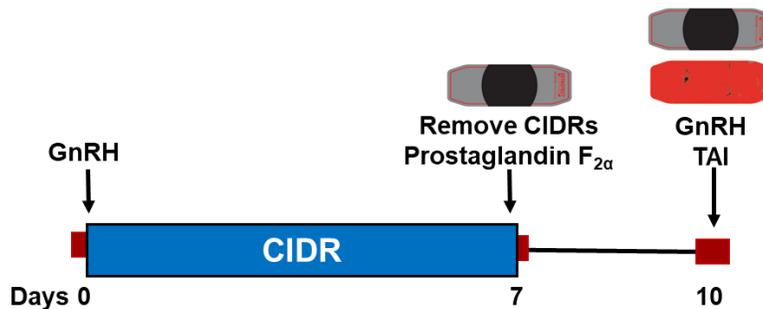
Recognizing females in estrus is also useful for cattle producers when utilizing sexed semen. Sexed semen often results in a slight reduction in



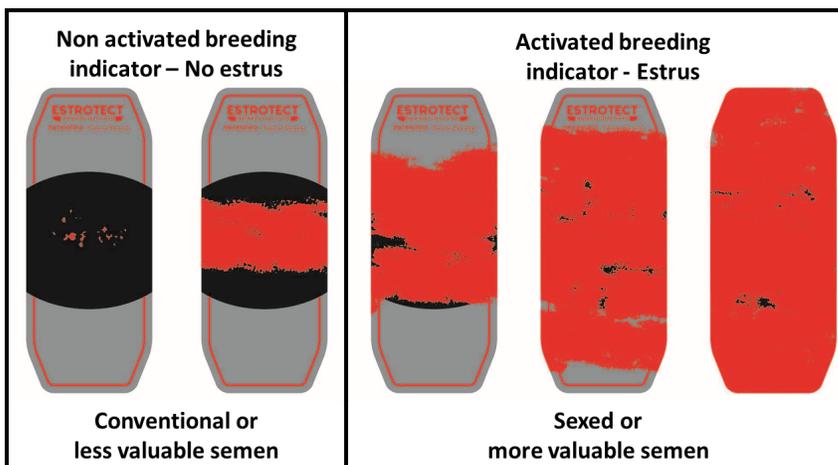
pregnancy rates when compared with conventional semen; however, estrus expression influences the magnitude of these differences. In a recent study evaluating the impact of estrus expression on pregnancy rates to sexed semen, females that expressed estrus and received sexed semen had 8% lower pregnancy rates when compared with females that expressed estrus and received conventional semen. In the same study, females that received sexed semen but did not express estrus had 23% lower pregnancy rates compared with non-estrous females that received conventional semen (Perry et al., 2020). Therefore, utilizing sexed semen in females that express estrus and conventional semen in those that do not express estrus may yield greater conception rates and may help producers reduce their cost per pregnancy with sexed semen. It is

important to keep in mind that fewer females will be serviced with sexed semen and fewer calves will be born with the desired sex. A good rule of thumb is to expect that approximately 60% of the females in the group will express estrus before fixed-time artificial insemination. In this situation, these 60% would be serviced with sexed semen and the remaining 40% would be serviced with conventional semen.

Performing artificial insemination based off estrus detection can be time consuming. However, producers that use fixed-time artificial insemination and want to target breed females according to estrus expression can take advantage of estrus detection aids, which help to identify females in estrus without much added labor. A few examples of estrus detection aids include tail chalking, EstroTECT



**Figure 1.** Diagram indicating when to place estrus detection aids to identify females in estrus during the 7-day CO-Synch + CIDR protocol. Estrus detection aids should be placed at the time of the prostaglandin F<sub>2α</sub> injection and evaluated at artificial insemination. The same concept can be applied to other estrus synchronization protocol.



**Figure 2.** Diagram describing how to interpret breeding indicator patches to target breed females in a fixed-time artificial insemination program

Breeding Indicators, and Kamar Mount Detectors. Estrus detection aids should be placed during the last animal handling event before fixed-time artificial insemination. For example, in the 7-day CO-Synch + CIDR protocol, the estrus detection aid would be applied when the prostaglandin F2 $\alpha$  injection is administered at CIDR removal (Figure 1). Producers can then evaluate the patch at the time of fixed-time artificial insemination to distinguish females that expressed estrus from females that did not express estrus and then target breed them based on their patches (See Figure 2).

In summary, estrus expression positively influences pregnancy rates in fixed-time artificial insemination and embryo transfer programs. Through the use of estrus detection aids, cattle producers can identify females that are more likely to conceive without having to perform conventional estrus detection and can make more specific breeding decisions based on estrus expression. For more information regarding general aspects of beef cattle reproduction, artificial insemination, embryo

transfer, estrus synchronization protocols, etc, please contact your local Extension office or go to [ugabeef.com](http://ugabeef.com).

#### **Literature Cited**

Perry GA, Walker JA, Rich JJJ, Northrop EJ, Perkins SD, Beck EE, Sandbulte MD, Mokry FB. Influence of Sexcel™ (gender ablation technology) gender-ablated semen in fixed-time artificial insemination of beef cows and heifers. *Theriogenology*. 2020. 146:140-144.

Pohler KG, Peres RFG, Green JA, Graff H, Martins T, Vasconcelos JLM, Smith MF. Use of bovine pregnancy-associated glycoproteins to predict late embryonic mortality in postpartum Nelore beef cows. *Theriogenology*. 2016. 85:1652-1659.

Richardson BN, Hill SL, Stevenson JS, Djira GD, Perry GA. Expression of estrus before fixed-time AI affects conception rates and factors that impact expression of estrus and the repeatability of expression of estrus in sequential breeding seasons. *Anim. Reprod. Sci.* 2016. 166:133-40.



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