Estrus Synchronization Programs for Natural Service

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Highlights

- **Females that become pregnant early in the breeding season wean heavier calves and are more likely to become pregnant in the subsequent breeding season**
- **Beef producers that do not utilize artificial insemination can improve their calf crop by synchronizing estrus for natural service**
- **Estrus synchronization for natural service increases the percentage of cows that become pregnant early in the breeding season, resulting in heavier steer and heifer calves at weaning**
- **Heifers that are born early in the calving season are more likely to succeed as replacements compared with heifers born later in the season**

Introduction

Estrus synchronization programs allow cattle producers to manipulate the estrous cycle of cows and heifers, facilitating the adoption of biotechnologies such as artificial insemination. Although artificial insemination is a powerful tool to incorporate superior genetics, estrus synchronization also can be utilized to increase productivity of cow-calf operations that rely solely on natural service. This bulletin provides an objective evaluation of common estrus synchronization protocols for their usefulness with natural service rather than artificial insemination.

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Economic impact of early calving

Cattle producers commonly evaluate reproductive performance by determining how many cows became pregnant during the breeding season. Although pregnancy rates are important, *when* females become pregnant within the breeding season is a major component of cow-calf profitability. Cows that become pregnant early in the breeding season calve earlier in the calving season. Consequently, they have more time to recover before the next breeding season, which increases their chances of subsequently becoming pregnant and staying longer in the herd.

The performance and value of the progeny is also substantially influenced by when they are born within the calving season. Research indicates that steers born in the first 21 days of the calving season were 32 lb heavier than those born in the second 21-day interval, and 80 lb heavier than calves born later than 42 days after the beginning of the calving season. In the same study, heifers born in the first 21 days of the calving season were heavier at weaning and at the beginning of their first breeding season, and a greater percentage were pubertal. Early-born heifers also were more likely to calve in the first 21 days of their first calving season, indicating that heifers born early in the calving season are more likely to succeed as replacement heifers (Funston et al., 2012; Table 1). Overall, becoming pregnant early in the season causes a series of events that positively impact production efficiency in cow-calf operations.

Estrus synchronization programs can induce cyclicity in cows that are in *postpartum anestrus*—not cycling after calving—and in heifers that have not reached puberty. Additionally, these programs can be utilized strategically to synchronize females at random stages of their estrous cycles to express estrus at the beginning of the breeding season. Combining estrus synchronization with natural service can increase the percentage of cows and heifers that become pregnant early in the breeding season. Next, we will discuss synchronization protocol options that can be incorporated by cow-calf producers utilizing only natural service.

Synchronization Protocols

1) One shot of prostaglandin F2α

This protocol consists of a single injection of prostaglandin F2α (often abbreviated as PG or PGF2α) that can be administered either when bulls are turned in with the herd or no later than 4 days after bulls are turned in. Only one trip through the chute is required; this method costs approximately $2.80 per head. Previous research on this program has shown an overall 12% increase in the percentage of females calving in the first 21 days of the calving season (Larson et al., 2010). This protocol is recommended for both cows and heifers.

It is important to keep in mind that only females that are cycling can respond to a prostaglandin injection. Previous research evaluated the effectiveness of this protocol according to whether heifers were cycling before the beginning of the breeding season (Perry, 2005). Heifers that were cycling had a 30.7% increase in pregnancy rates during the first 4 days of the breeding season (synchronized = 55.7% and nonsynchronized = 25.0%). However, no differences were observed between treatments when heifers were not cycling. Therefore, this protocol is recommended for herds where most females are cycling before the breeding season. These are herds in which most cows have more than 60 days postpartum at the beginning of the breeding season and have a body condition score equal to or greater than 5. Similarly, most well-developed heifers with *Bos taurus* genetics are cycling at the beginning of the breeding season.

2) Seven-day CIDR

The 7-day controlled internal drug release (CIDR) protocol can be utilized in both cows and heifers and requires two trips through the chute. The CIDR device is inserted 7 days before the beginning of the breeding season and removed on the same day that bulls are turned in with the herd. Because the CIDR device releases progesterone (a hormone naturally produced in cattle), this protocol can induce cyclicity in anestrous cows and prepubertal heifers. Therefore, this protocol is particularly beneficial for noncycling females, such as postpartum cows that calved toward the end of the calving season. This synchronization protocol will cost approximately $13 per female. Although more expensive, the ability of this protocol to induce cyclicity makes it a powerful tool to shift the calving distribution. Previous research has shown an increase of 45% in pregnancy rates (synchronized = 67% and nonsynchronized = 23%) during the first week of the breeding season when heifers were treated with progesterone (Perry, 2005).

3) Fourteen-day CIDR or melengesterol acetate

These protocols are recommended only for replacement heifers. The CIDR device or melengesterol acetate (MGA) is utilized for 14 days in these programs. An important consideration in both protocols is that the first estrus after progesterone (CIDR or MGA) withdrawal is not fertile. For this reason, producers should only turn in bulls 10 days after CIDR or MGA withdrawal. Melengestrol acetate is an orally fed progestin that is provided to heifers with a feed carrier; therefore, this program can be incorporated without the need of running heifers through the chute. MGA protocols also are considerably less expensive—approximately $0.25 per head per day of feeding. Heifers need to consume 0.5 mg per head per day in this program. The success of synchronization protocols that rely on MGA are highly dependent on adequate intake of the product; producers utilizing MGA need to provide adequate conditions to allow every heifer to consume the recommended amount daily. Additionally, it is important to emphasize that the use of MGA is not labeled for use in mature cows. Therefore, its use is restricted to replacement heifers. The effectiveness of these protocols to shift the calving distribution are comparable to the 7-day CIDR.

Female considerations

Proper nutritional and health management is paramount for adequate response to estrus synchronization protocols. While these protocols repeatedly have been demonstrated to be effective, in research and out in the field, to induce cyclicity and increase the percentage of females becoming pregnant early in the breeding season, they do not replace proper cow-herd management. Mature cows should be managed to achieve a body-condition score greater than 5 at the beginning of the breeding season. Heifers should be managed to attain 60–65% of their expected mature body weight at the beginning of breeding season. Mature body weight can vary among different herds, and assessing mature cow body weight will help producers to accurately establish a target weight at breeding specific for their replacement heifers. Females that do not meet these criteria still can benefit significantly from estrus synchronization, but their productivity and response to synchronization protocols is suboptimal.

Another important consideration that will facilitate the implementation of estrus synchronization programs is having an established breeding season. Controlled breeding provides cow-calf producers many benefits related to management, facilitating herd health activities, culling infertile females, and marketing a uniform calf crop. These factors ultimately will impact production revenue positively. Producers that are transitioning to a controlled breeding season can achieve that goal faster by implementing estrus synchronization protocols.

The consequences of challenging environmental conditions can be mitigated by estrus synchronization. For example, drought situations may lead to a decrease in forage availability and consequently reduce body-condition scores. Herds of cows that have suboptimal body-condition scores will have a greater percentage of their cows in anestrous (not having regular estrous cycles). Estrus synchronization can be utilized strategically in these herds to induce some of these cows to resume cyclicity and increase their chances of becoming pregnant.

Bull considerations

The utilization of synchronization programs will result in a greater percentage of females coming into estrus in a shorter period. In these programs, using no less than one experienced bull for every 25 females is recommended. Producers utilizing bulls that are younger than 3 years of age should consider decreasing the number of cows per bull. It's very important for a veterinarian to perform a breeding-soundness examination prior to the breeding season. A local large animal veterinarian can perform these exams for an affordable price, and they allow producers to identify subfertile bulls and decrease the risk of reduced pregnancy rates. In the case of small groups of females that are placed with a single bull, it is recommended that producers observe bulls during the breeding season to make sure they are actively breeding.

Conclusions

Cow-calf producers in Georgia and across the United States can benefit from estrus synchronization protocols, regardless of whether they intend to utilize artificial insemination or natural service. Estrus synchronization programs for natural service can be incorporated with minimal handling of animals through the chute or sometimes without any handling (i.e., the 14-day MGA protocol). These programs will increase the number of cows calving early, increasing the weaning weights of their offspring and their chances of rebreeding in the subsequent season. For producers that want to incorporate estrus synchronization, resources are available through your local Extension agents and at beef.caes.uga.edu.

Table 1. Differences in progeny performance according to their calving dates.

	Calving period, 21-day intervals		
	Period 1	Period 2	Period 3
Steer weaning weight, lb	515[a]	483[b]	435[c]
Heifer weaning weight, lb	483[a]	470[b]	434[c]
Heifer prebreeding weight, lb	653[a]	644[b]	609[c]
Heifers cycling, %	70[a]	58[b]	39[c]
Heifer pregnancy rate, %	90[a]	86[a]	78[c]
Calved in first 21 days*, %	81[a]	69[b]	65[b]

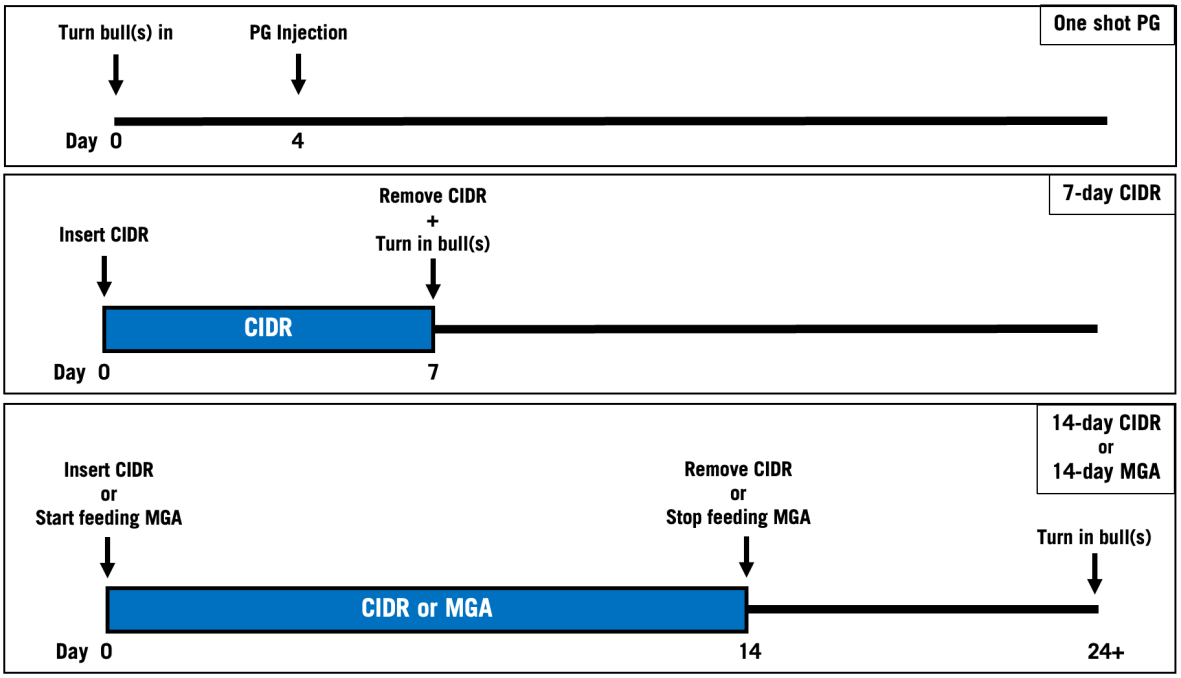
Note. Steer (n = 771) and heifer (n = 1019) progeny were divided according to their calving dates. Period 1: Calves born in the first 21 days of the calving season. Period 2: Calves born between days 22 and 43 of the calving season. Period 3: Calves born after day 43 of the calving season.

*This row represents the percentage of heifers that calved during the first 21 days of their first breeding season according to when they were born (Period 1, 2 or 3).

[a,b,c] Different superscripts represent statistical differences between calving periods ($p < 0.05$).

Adapted from "Effect of calving distribution on beef cattle progeny performance," by R. N. Funston, J. A. Musgrave, T. L. Meyer, and D. M. Larson, 2012, *J Anim Sci.*, *90*(13), 5118–5121 (https://doi.org/10.2527/jas.2012-5263). Copyright 2012 by Oxford University Press.

Figure 1. Timeline of estrus synchronization protocols for beef producers utilizing only natural service.



PG = Prostaglandin F2α.
CIDR = Controlled internal drug release device.
MGA = Melengestrol acetate.

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