

Estrous Synchronization in Virgin Heifers

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Dramatic genetic improvements can be achieved through artificial insemination (AI) and have greatly enhanced the US cattle industry. However, very few commercial and few seedstock beef herds utilize AI. Obstacles preventing the widespread adoption of AI by beef producers are numerous and varied, but primarily focus around labor, time, facilities, and availability to adequately detect cows in heat. Estrous synchronization is a tool that is commonly used in tandem with AI and may be used to synchronize either estrus or ovulation. Synchronization of estrus may overcome some labor and time expenses usually associated with AI. This facilitates the breeding of multiple heifers in a short time period, reducing labor needs and shortening calving intervals. In addition, ovulation synchronization protocols remove heat detection to further reduce time and labor expense. For a synchronization protocol to be successful, it must first regress the corpus luteum (CL), then promote the growth of new follicles, and induce estrus or ovulation. Combination AI and synchronization programs with virgin heifers offer several advantages over traditional management with a bull in a mature cowherd:

- Smaller numbers of animals are usually involved, allowing a new AI user to start gradually.
- No calves are present to handle and work around during the breeding season.
- Using carefully selected AI sires for heifers can reduce or eliminate calving difficulty.
- Synchronizing heifers will shorten calving season for heifers, which will allow for efficient use of labor.
- Heifers, as a group, should be genetically superior to older animals in your herd.
- Heifers should also be the most fertile animals with the highest conception rate in a herd

Estrous Synchronization Protocols:

Different pharmacological products are available to synchronize estrus in beef cattle. Those products are broken down by class and listed in Table 1. Estrous synchronization protocols can be broken down into three different classes: 1.) heat detect and breed, 2.) timed-artificial insemination (TAI), and 3.) combination of heat detection and TAI. The heat detect and breed class is the conventional method of choice for most AI users. However, for those operations where time and labor may not be consistent, TAI or a combination of TAI and heat detection can be very effective. Timed-artificial insemination attempts to synchronize ovulation and allows producers to schedule when they want to breed.

Table 1. Pharmacological Products Used in Estrous Synchronization of Beef Cattle

Product Name	Dose, delivery method	Action
<i>Gonadotropin Releasing Hormone (GnRH, keep refrigerated)</i>		Release of LH and formation of Corpus Luteum
Cystorelin	2 ml, i.m.	
Fertagyl	2 ml, i.m.	
Factrel	2 ml, i.m.	
Ova-Cyst	5 ml, i.m.	
<i>Progestins</i>		Imitate Corpus Luteum
Melengestrol Acetate (MGA)	0.5 mg/head/day orally	
Control Internal Drug Release (CIDR)	7 days intravaginally	
<i>Prostaglandins</i>		Regress Corpus Luteum
EstroPLAN	2 ml, i.m.	
Estrumate	2 ml, i.m.	
In-Synch	5 ml, i.m.	
Lutalyse	5 ml, i.m.	
Prostamate	5 ml, i.m.	

Prostaglandins (PG)

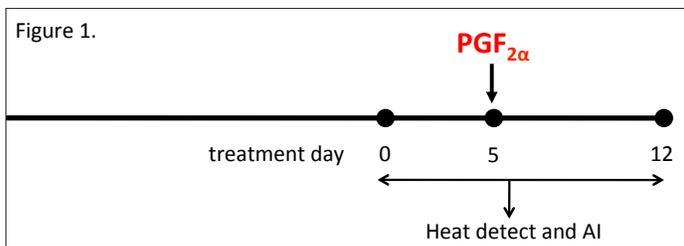
The prostaglandin products are equally effective and are all highly luteolytic, which means they will regress a corpus luteum (CL). When administered to cycling heifers that have a functional CL (days 6 to 18 of a heat cycle – Figure 9), it will cause the CL to regress. In these animals, rapid CL regression will be followed by heat 2 to 5 days after administration of the drug. Heifers in days 1 to 5 of a heat

cycle do not have a functional CL and will not respond to PG or show a shortened cycle. Heifers in days 18 to 21 of a cycle are in midst of natural CL regression and, therefore, will not respond to the drug, but will show heat within one to four days anyway. Thus, in a group of cycling heifers, approximately 75 to 80 percent will come into heat 1 to 5 days after PG administration (i.e., all cycling heifers except those in days 1 to 5 of a cycle when injected). Because approximately 20 to 25% of all heifers will be in days 1 to 5 of their heat cycle and will not respond to a single injection of PG, a number of programs have been developed to capture these heifers.

Progestin and Prostaglandin combination treatments
 Progestins are hormone compounds that prevent heifers from exhibiting estrus. Melengestrol acetate (MGA) at a dosage of 0.5 mg/head per day and controlled internal drug release (CIDR) are examples of progestin products commercially available for use in heifers. These products used in combination with PG are very effective in synchronizing estrus and ovulation. Another commonly used product is gonadotropin-releasing hormone (GnRH), which stimulates a dominant follicle to ovulate. The protocols below have been developed through many years of research and experience. Timing or dosage of drug administration in these protocols should not be adjusted without seeking advice from your local veterinarian or someone with significant experience synchronizing estrus.

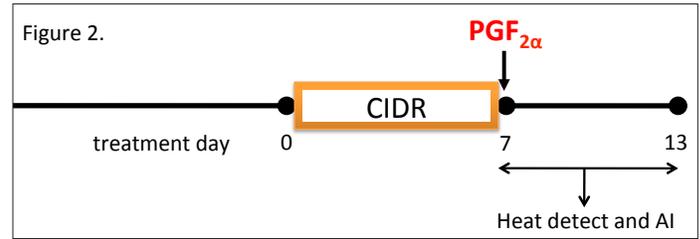
Heat Detection Protocols

1-Shot PG (Figure 1): The one-shot prostaglandin protocol is a very basic protocol in which heifers are heat detected for 12 days. On the 5th day of heat detection, one shot of PG is given and the heifers that respond will come in heat in 3 - 5 days. Heifers that have a functional CL greater than 5 days old will respond to this protocol.

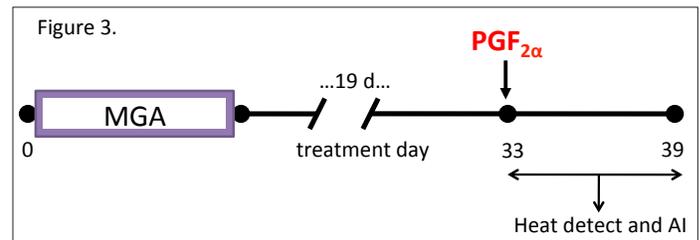


CIDR + PG (Figure 2): The CIDR is inserted intravaginally for 7 days. On d 7, the CIDR is removed and an injection of PG is given. From day 7 to 12, heats

are observed and cattle are bred 12 hours after standing heat. The CIDR added to this protocol helps those heifers that did not have at least a 5 day old CL. It also decreases the number of days for heat detection.

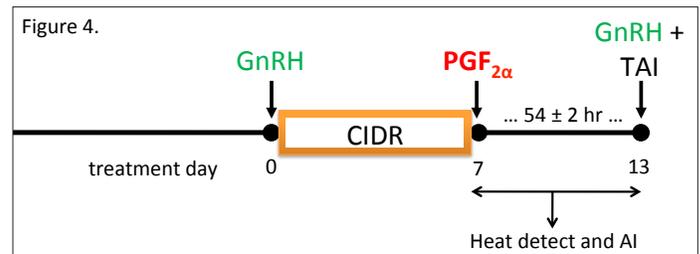


MGA + PG (Figure 3): MGA is a feed additive progestin product. MGA is very similar to the CIDR; however, the duration for treatment varies by 7 days. Heifers coming off of MGA have a first heat that is infertile. For this reason, there is a 19 day lag is between MGA and PG shot. MGA is not labeled for use in cows.



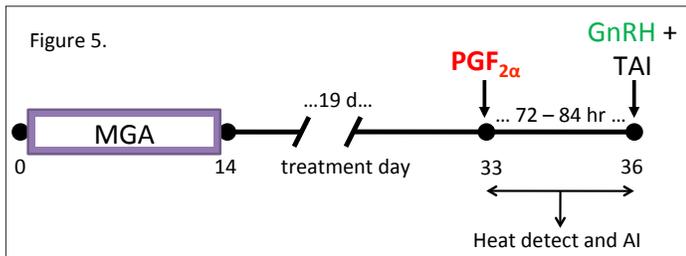
Heat Detect and TAI Combination Protocols

CO-Synch + CIDR (Figure 4): This protocol uses several different pharmacological products to synchronize ovulation. Cost is higher, but labor to detect estrus is reduced.



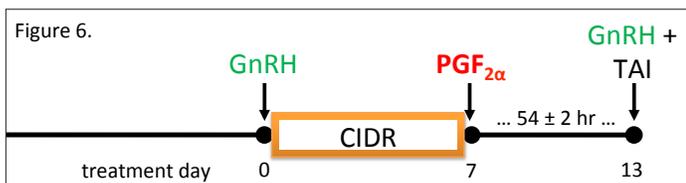
MGA – PG (Figure 5): For operations that have ample bunk space to feed heifers and make sure each heifer is getting an effective dose of MGA. Same 19 d lag as

MGA + PG heat detect protocol due to the infertile first cycle, but shorter heat detect and AI window. Breed heifers and give GnRH injection 72 hours after PG injection.

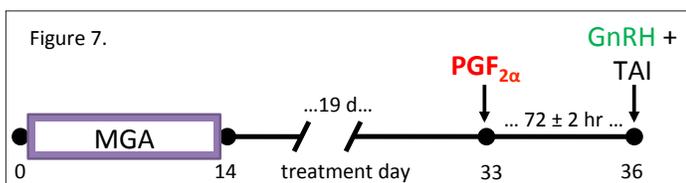


Fixed-Time AI Protocols

Select Synch + CIDR and TAI* (Figure 6): Uses heat detection for 3 days to breed any heifers that may come in early and then TAI the remainder 72 -84 hours after CIDR removal and PG injection.

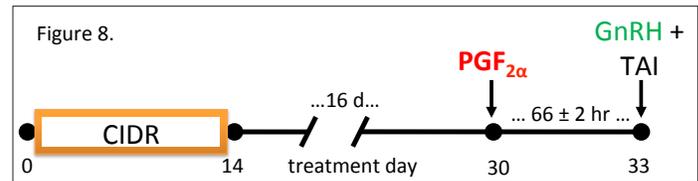


MGA – PG + TAI* (Figure 7): For operations that have ample bunk space to feed heifers and make sure each heifer is getting an effective dose of MGA. This protocol allows for 3 days of heat detection and AI, followed by a final TAI 72 -84 hours after PG injection.



14-day CIDR – PG (Figure 8): This protocol is very similar to the MGA protocol listed above. However, duration between CIDR removal and PG injection is shorter due to faster clearance of progestin from a CIDR.

For operations that do not have adequate bunk space to feed and monitor MGA intake this protocol is a good option.



When following any of these products and programs, several options are available to the beef producer. Bulls can be turned in with heifers 10 days following the last AI breeding. This will probably be the program of choice for commercial herds as it yields the benefit of AI with the least amount of labor. If the goal of a breeding program is to have as many heifers bred to AI sires as possible, it might be expedient to remove herd bulls approximately 18 days following the synchronized breeding and repeat a conventional AI program for about 10 more days. This would yield an additional service on heifers not pregnant to the first AI at a synchronized estrus. Bulls can then be returned to the herd for the duration of the breeding season. Of course, there is always the option of continuing your AI program for 30 to 45 days after synchronizing estrus. Which gives 2 or 3 opportunities to get heifers bred AI. Where labor and time is available for heat detecting, this is the program of choice for most registered herds. It may be advantageous to your operation to utilize estrous synchronization and natural service. In addition to or in lieu of AI, the above protocols can also be utilized before turning bulls out. However, the number of heifers per bull may need to be reduced to allow the bull to naturally cover heifers in a short amount of time. If monitoring of breeding dates is important, these bulls might be equipped with chin-ball markers to determine which heifers were bred naturally.

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