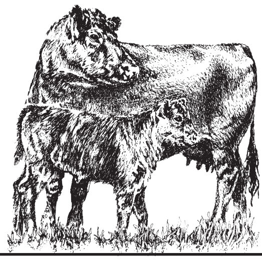

2016 Protocols for Synchronization of Estrus and Ovulation in Beef Cows and Heifers

Biotechnology presents beef producers with an unprecedented opportunity to improve herd genetics. Producers have more precise tools for genetic selection. Research has led to a better understanding of methods to induce and synchronize estrus and ovulation in postpartum cows and replacement heifers. These improvements enable producers to expand their use of artificial insemination (A.I.) and make it possible to inseminate cows at predetermined times and to achieve pregnancy rates comparable to those gained after several days of detecting heat.

Many options exist for synchronization of estrus and ovulation. This short list of protocols, based on research and field use by reproductive physiologists, veterinarians, and professionals in related industries, is intended to help cattle producers to select an appropriate synchronization option.

Protocol Selection

Before selecting a protocol, assess animals intended for synchronization. Consider body condition of cows and heifers and days postpartum for cows. Evaluate resources, including facilities, labor, experience, and budget.

Heat Detection

The first step is to determine how much heat detection is feasible or desired. Ask yourself how much time you can devote to heat detection and if you can do it well. Animal sorting and heat detection are simple and effective in some management systems but difficult in others. Poor heat detection will result in a lower A.I. pregnancy rate.

Protocols can be divided into three groups based on time required for heat detection:

1. 7 to 8 days;
2. 3 days, followed by fixed-time A.I. of all animals not previously detected in heat (cleanup-timed A.I.); or
3. Strict, fixed-time A.I.

Cow Factors

Any of the synchronization protocols presented here are recommended for mature cows with a body condition score of 5 or greater that are at least 50 days postcalving at the time of A.I. Young, thin, and late-calving cows are less likely to have resumed their estrous cycles at the beginning of the breeding season. If a high percentage of cattle fall into these categories, consider protocols that include a progestin (a compound that acts like progesterone) that mimics the first cycle after calving.

An intravaginal progesterone-containing insert, such as a CIDR (controlled internal drug release), will induce some noncycling cows to cycle and improve their chances of conceiving to A.I. If cows are too thin or have calved too recently, synchronization of estrus may not be effective.

Heifer Factors

Age and weight influence onset of puberty in heifers. Heifers should attain 60 percent of their mature weight before breeding. Because mature cow size has increased over the years, producers may underestimate mature size and target weight. Scoring heifer reproductive tracts (1 = infantile to 5 = tract mature and ovary contains a corpus luteum) 50 to 60 days before breeding gives the producer a truer measure of physiological maturity and time to adjust rations before breeding.

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Synchronization programs tend to be more successful when 50 percent of heifers have a tract score of 3 or better 50 to 60 days before breeding. Protocols that include a progestin—delivered orally, such as MGA (melengesterol acetate), or intravaginally as a CIDR—may induce some prepubertal heifers to cycle.

Other Factors

Duration of the protocol, number of times handled, and the ability to successfully administer treatments are other factors to consider in protocol selection. For example, successful use of MGA depends on uniform daily consumption by all heifers. Management system, feed resource flexibility, and facilities help determine which protocol works best in a particular environment. Protocol success depends on proper administration and timing of treatments.

For help, see the Estrus Synchronization Planner (www.iowabeefcenter.org/estrus_synch.html). This tool generates a daily calendar of activities and can compare costs of up to three protocols. The mobile version (www.estrussynch.com) generates a protocol application schedule that can be shared via email.

Cost

Heat-detection protocols generally cost less than fixed-timed A.I., provided that labor is available or can be hired. Treatments, semen, and number of handlings contribute to cost of synchronization. Savings from fewer bulls needed for natural service and higher returns based on age and weight of A.I.-sired calves should also be considered.

A.I. will be most effective for producers who capture additional returns from A.I.-sired calves. A decision tool, A.I. Cowculator, allows users to determine net gain or loss per cow exposed if A.I. were used in place of natural service. Calculations are based on user inputs related to costs of natural service sires, cowherd, and A.I. The tool is available for Android and iPhone devices or as a spreadsheet (www.beefrepro.info).

Which Animals Should I Synchronize?

When starting an A.I. program, replacement heifers are the easiest group of animals with which to work, and first-calf heifers are the most difficult. Start simply and add more animals as you gain experience.

Products Used

Hormones common to many protocols are prostaglandin F_{2a} (PG), gonadotropin releasing hormone (GnRH), and progestins. They are available in the commercial products listed in Table 1.

Table 1. Commercial names of products used for synchronization of estrus.[1]

Type	Commercial name
GnRH	Cystorelin, Factrel, Fertagyl, GONAbreed, OvaCyst
PG	estroPLAN, Estrumate, In-Synch, Lutalyse, ProstaMate
Progestin	MGA (melengesterol acetate), CIDR (progesterone)

[1]Follow label directions for dose and route of administration.

Protocols

Heat-Detection Protocols

Animals in these protocols should be inseminated 6 to 12 hours after the first observation of standing heat. During peak activity (48 to 72 hours after PG for most systems), plan to spend at least 3 hours per day observing animals to detect heat, and preferably 5 to 6 hours. Divide total observation time into three or more times throughout the day. The larger the group, the more time required for heat detection.

Protocols for use in cows include **Select Synch** and **Select Synch + CIDR** (Fig. 1). Include the CIDR when more cows are likely to be noncycling and/or when heat detection before PG is not feasible. With Select Synch, 5 to 20 percent of animals may show heat 1.5 to 2 days before PG. Both protocols could be applied to the same group of cows, placing CIDRs in young, thin, and late-calving cows.

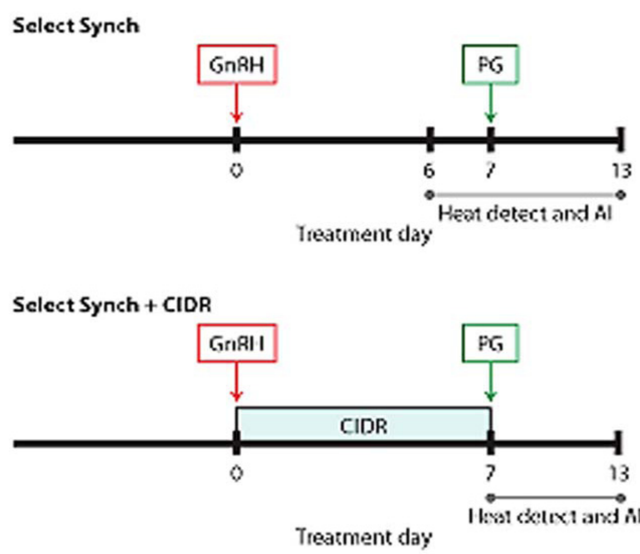

Fig. 1. Heat detection only protocols for cows: Select Synch and Select Synch + CIDR.

The **7-day CIDR-PG** protocol (Fig. 2) is recommended for use in heifers in contrast to the Select Synch + CIDR protocol for cows. The difference is that heifers do not require the GnRH injection at the beginning of the treatment.

Research has shown pregnancy rates from the 7-day CIDR-PG protocol to be similar to those from the Select Synch + CIDR protocol in heifers. Select Synch is not recommended for heifers because it produces a wider range of responses, possibly due to inconsistent response to GnRH.

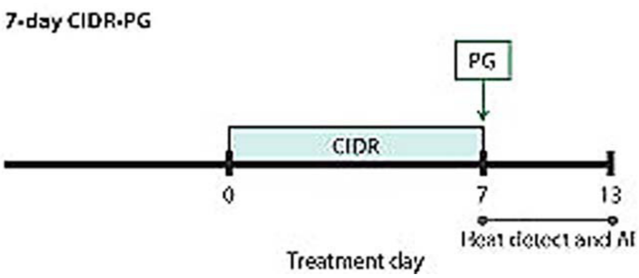

Fig. 2. Heat detection only protocol for heifers, 7-day CIDR-PG.

Feeding MGA is specifically approved for estrus suppression in heifers only. The MGA-based protocol recommended for heifers is **MGA-PG** (Fig. 4). This protocol requires more planning because it begins with feeding MGA for 14 days starting 33 days before PG injection. If MGA can be accurately delivered daily, this is an effective protocol for beef heifers.

The original recommendation for the interval between the last feeding of MGA and PG injection was 17 days. Delaying this interval to 19 days improves synchrony of estrus.

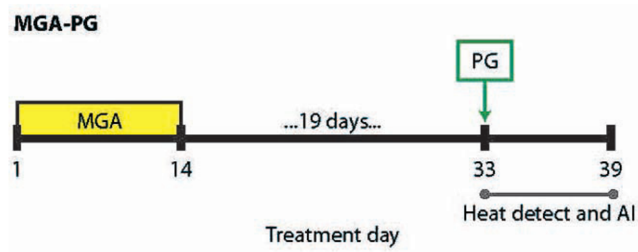

Fig. 4. Heat detection only protocol for heifers, MGA-PG.

PG 6-day CIDR is another heat detection option (Fig. 3). This protocol reduces treatment costs for cows inseminated after the first PG. It requires more days of heat detection and enough synchronization products on hand for all cows. This protocol can be used on cows or heifers.

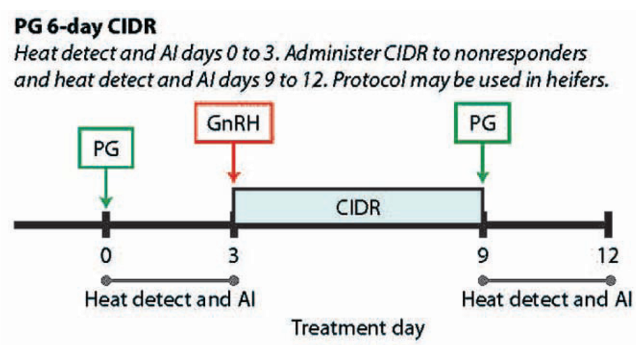

Fig. 3. Heat detection only protocol, PG 6-day CIDR.

A single injection of **PG** (Fig. 5) can be used on heifers. This protocol does not provide the same degree of synchrony as other protocols, and the heat detection period is twice as long. Nevertheless, it is a low-cost method that often works well for those just starting to use A.I. It can be used on cows, but because sorting and heat detection are more complex when the calf is present, other options should be considered more carefully.

Heifers that have not reached puberty or cows that have not initiated estrous cycles do not have a corpus luteum (the structure that forms at the ovulation site to produce progesterone to maintain pregnancy) and ***will not*** respond to this treatment. Heifers observed in heat and inseminated before the time of PG injection do not require PG.

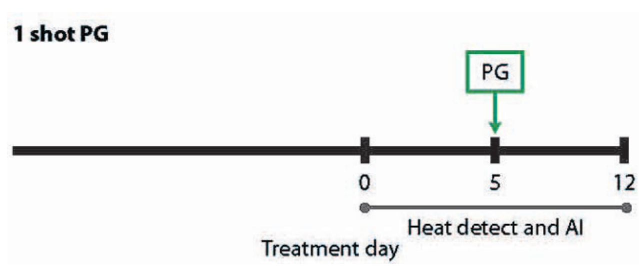

Fig. 5. Heat detection only protocol for heifers, single shot PG.

Heat Detection and Timed A.I. (TAI) Protocols

Heat detection and timed A.I. protocols involve A.I. 6 to 12 hours after observed estrus for 3 days, and then TAI of all nonresponders 72 to 84 hours after PG, with GnRH given at TAI. This reduces the amount of time spent on heat detection and gives early responders a better chance of conceiving compared to a single-fixed-timed A.I.

The same protocols recommended for heat detection are recommended for the combination of heat detection and timed A.I. in cows (Fig. 6). Success still depends on good heat detection, particularly for early heats in the Select Synch protocol.

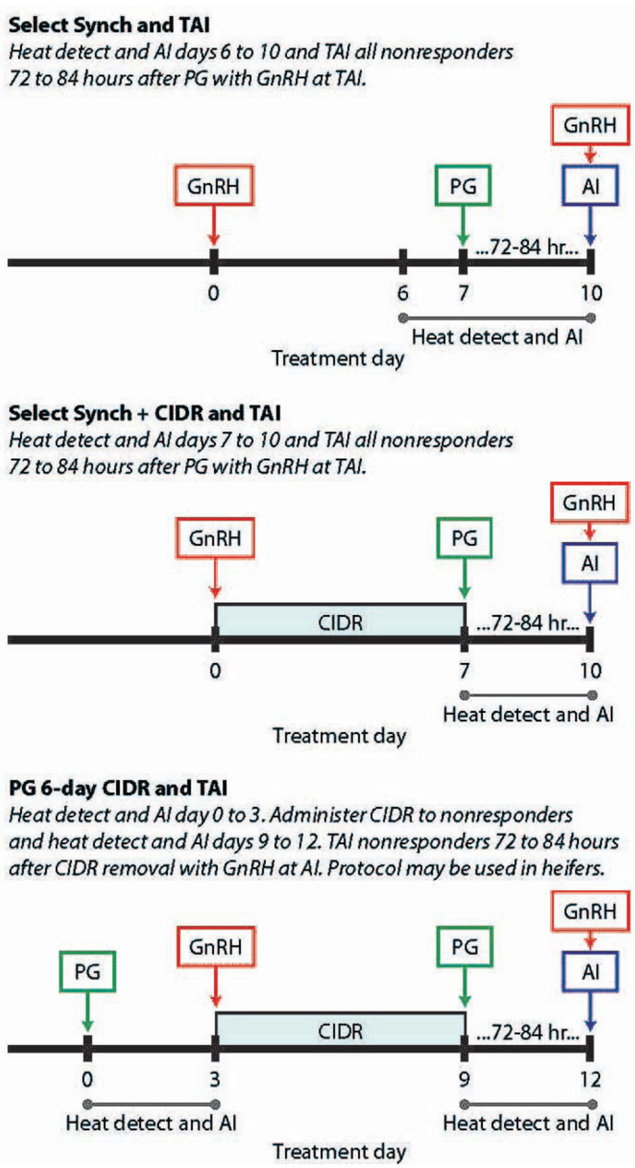

Fig. 6. Heat detection and cleanup-timed A.I. protocols for cows: Select Synch and TAI and Select Synch + CIDR and TAI, PG 6-day CIDR and TAI.

In heifers, one option that combines heat detection and timed A.I. is the Select Synch + CIDR and TAI protocol (Fig. 7). GnRH is recommended on day 0 in this protocol. It adds little additional cost, and heifers that do respond with a new follicular wave are more likely to conceive at the cleanup-timed A.I. MGA-PG and TAI is also recommended for use in heifers (Fig. 7).

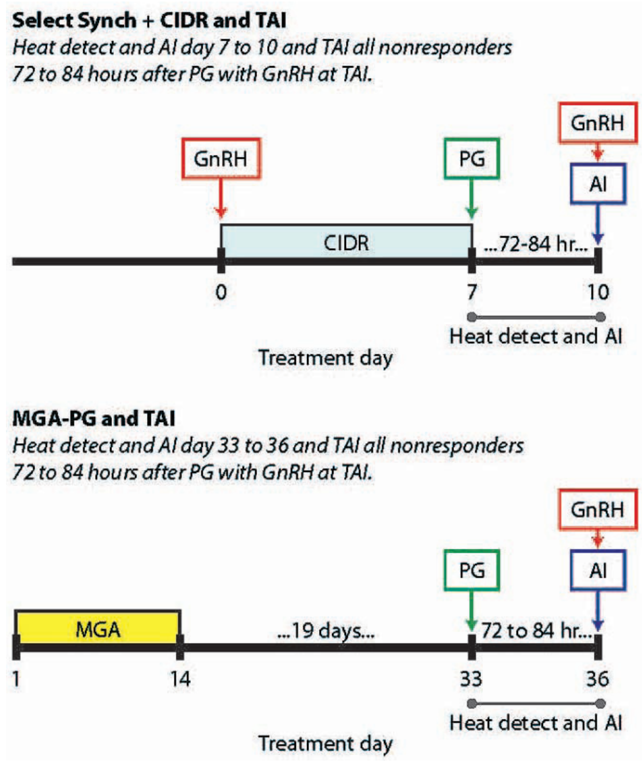

Fig. 7. Heat detection and cleanup timed A.I. protocols for heifers, Select Synch + CIDR and TAI and MGA-PG and TAI.

The third option for combination heat detection and TAI in heifers is **14-day CIDR-PG** (Fig. 8). This protocol is similar to MGA-PG, but the interval between CIDR removal and PG is reduced to 16 days because the progesterone in CIDR-treated animals clears the body much faster than melengesterol acetate in MGA-treated animals.

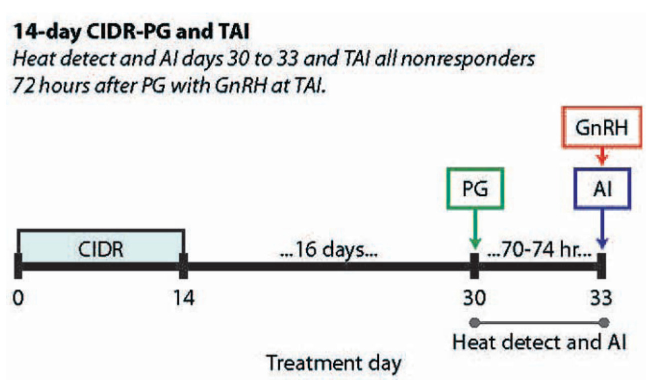

Fig. 8. Heat detection and timed A.I. protocols for heifers, 14-day CIDR-PG and TAI.

Fixed-Time A.I. Protocols

With fixed-time A.I. protocols, all animals are inseminated at a predetermined time. For cows, fixed-timed A.I. can produce pregnancy rates similar to those of protocols that require 5 to 7 days of heat detection. For heifers, pregnancy rates from current TAI protocols tend to be 5 to 10 percent lower than using heat detection alone.

The times listed for fixed-time A.I. should be considered as the approximate average time of insemination. This should be based on the number of females to inseminate, labor, and facilities. Synchronize no more females than can be inseminated at a particular facility in a 3- to 4-hour period.

Two short-term protocols are recommended for cows (Fig. 9) and heifers (Fig. 10). The interval from CIDR removal to insemination is generally shorter in heifers than cows. Cows should be inseminated between 60 and 66 hours after CIDR removal in the **7-day CO-Synch + CIDR** protocol, although insemination time for heifers is recommended at 52 to 56 hours after CIDR removal.

For the shortened **5-day CO-Synch + CIDR** protocol, two full doses of PG given 8 hours apart are critical for success. Interval from CIDR removal to insemination should be 70 to 74 hours for cows and 56 to 64 hours for heifers.

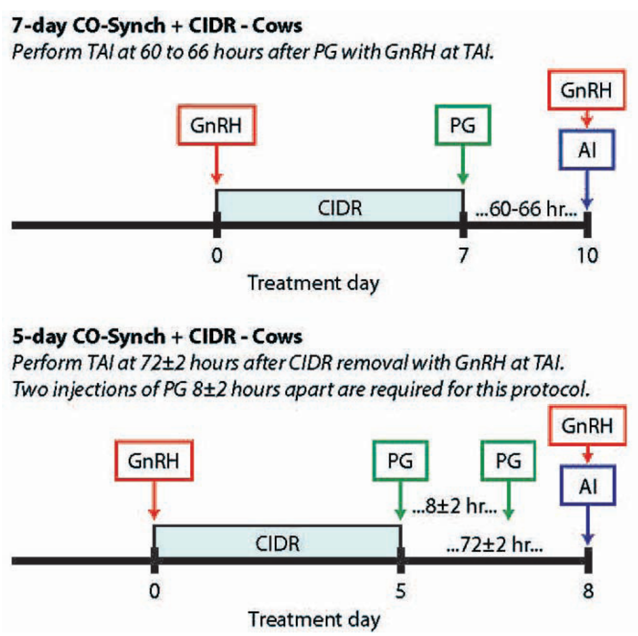

Fig. 9. Fixed-time A.I. protocols for cows: 7-day CO-Synch + CIDR and 5-day CO-Synch + CIDR.

This 5-day protocol has been adapted for *Bos indicus* (Brahman, Nelore) influenced cows by adding a dose of PG at the time of CIDR insertion: PG 5-day CO-Synch + CIDR (Fig. 11). This protocol has been shown to be more effective in *Bos indicus*-based cows than the 7-day CO-Synch + CIDR and 5-day CO-Synch + CIDR protocols, which are preferred for *Bos taurus*-based cows.

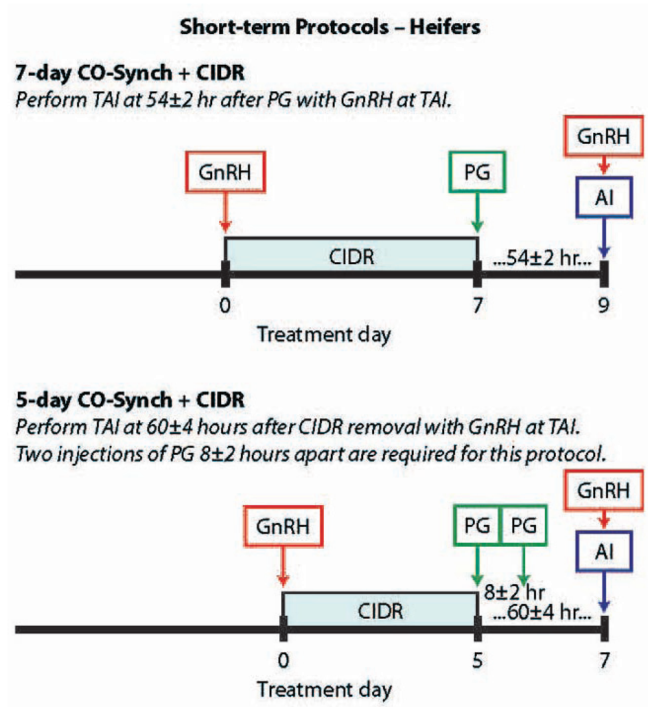

Fig. 10. Short-term fixed-time A.I. protocols for heifers: 7-day CO-Synch + CIDR and 5-day CO-Synch + CIDR.

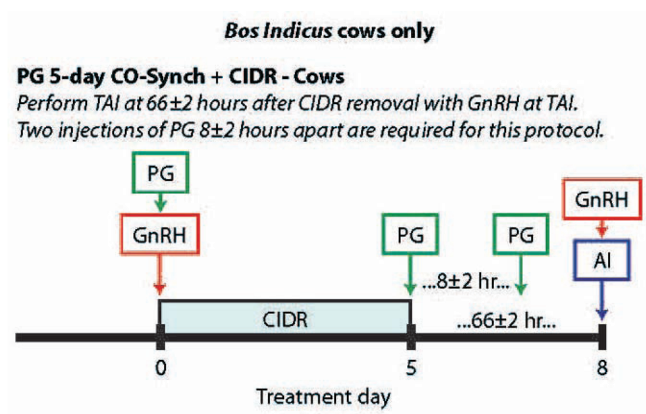

Fig. 11. Fixed-time A.I. protocol for *Bos indicus* cows, PG 5-day CO-Synch + CIDR.

The 14-day CIDR-PG (Fig. 12) protocol is a long-term, fixed-time A.I. protocol for heifers. It is 3 days shorter than MGA-PG and requires one more handling than 7-day CO-Synch+CIDR.

MGA-PG (Fig. 12) is another fixed-time A.I. in heifers; however, pregnancy rates tend to be lower than fixed-timed A.I. protocols. For many producers a CIDR-based protocol is lower risk fixed-time A.I. than MGA-PG because it does not rely on accurate, daily MGA consumption, and follicular growth should be better controlled.

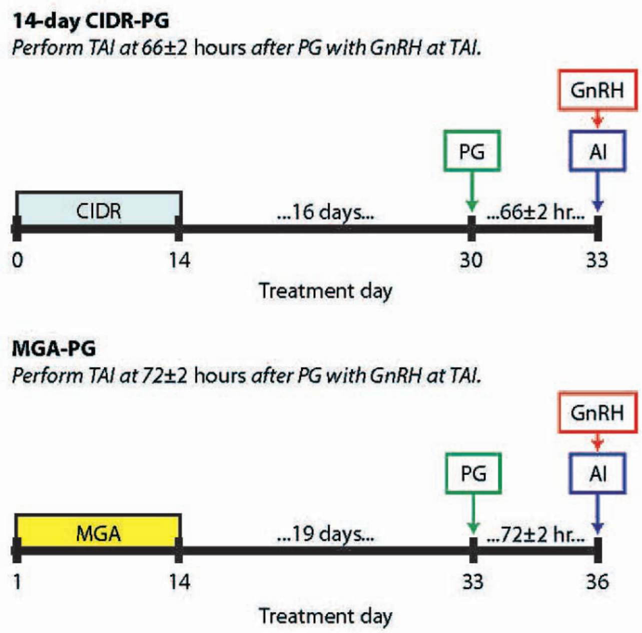

Fig. 12. Long-term fixed-time A.I. protocols for heifers: 14-day CIDR-PG and MGA-PG.

Protocol Development

Protocols presented in this publication are based on considerable research data and field use by a group known as the Beef Reproduction Leadership Team. This group is made up of individuals representing the A.I. and animal health industries, veterinarians, and reproductive physiologists with active research programs in this area. Other protocols should be considered only in unique situations and with the advice of an individual with extensive experience in synchronization of estrus. Protocols should not be altered without sound research data to support modifications.

This publication was developed by the Beef Reproduction Task Force. This multistate extension group aims to improve understanding of the physiological processes of the estrous cycle, procedures available to synchronize estrus and ovulation, and proper application of these systems.

The task force is made up of specialists from Kansas State University, Iowa State University, South Dakota State University, University of California-Davis, University of Florida, University of Idaho, University of Missouri, University of Nebraska, and University of Oregon. For more information, including the latest protocols, see www.beefrepro.info. For meeting coverage see www.appliedreprostrategies.com.

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