



Vet Call

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Synchronization of estrus

Many producers want a high percentage of heifers (and cows) to calve in the first two weeks of the calving season, with the calves sired by superior bulls via artificial insemination (AI). To meet this goal, the estrous cycle must be synchronized so a high percentage of treated females will show a fertile estrus (heat) within a narrowly defined time period. In the next three months I am going to discuss several synchronization methods. This month I will discuss the use of prostaglandin $F_{2\alpha}$ (PGF).

Progesterone is a naturally occurring hormone that is secreted by the corpus luteum (CL). The CL is a yellow structure on the ovary that forms from the tissue in and around a follicle after it ovulates. In natural cycles, progesterone from the CL controls the timing of estrus. About the 17th day of the estrous cycle, naturally

produced PGF acts to destroy the CL, which causes the blood levels of progesterone to decrease and initiates the series of hormone actions that cause ovulation. All synchronization methods are based (at least partially) on either mimicking the action of progesterone from the CL or by controlled removal of the CL and the progesterone it produces.

In the United States PGF is available as Lutalyse® or Estrumate®. These products only work in heifers or cows that are cycling (only cycling animals can have a CL) by causing lysis (disintegration) of the CL with a corresponding decrease in circulating progesterone levels. Falling progesterone levels lead first to the final maturation of the ovulatory follicle (egg) and then to expression of heat followed by ovulation. This series of events is indistinguishable

from the normal events that occur around the 17th day of the estrous cycle.

A CL must be present on the ovary in order for a PGF injection to affect the estrous cycle. A CL is present and considered mature five days after a heifer shows heat, and it is destroyed about 12 days later.

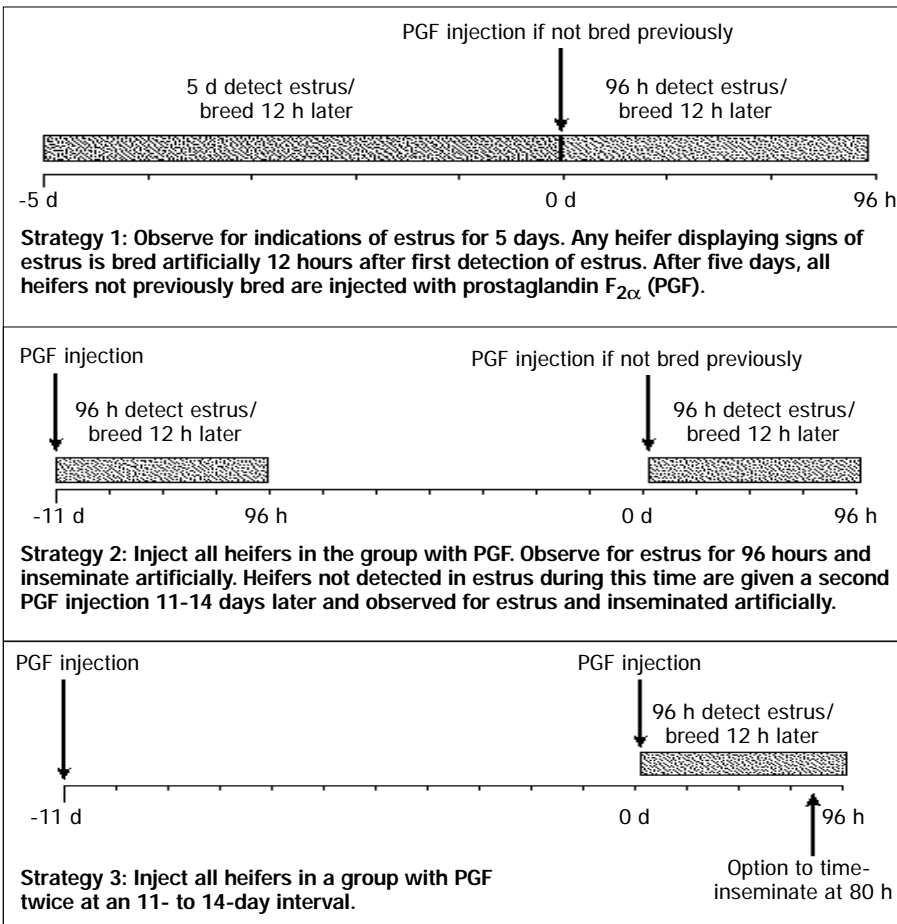
Assuming that about the same number of heifers in a group exhibit estrus each day, 55% of cycling heifers should respond to PGF by undergoing CL lysis, because these heifers are in the mid- to late-luteal phase of the estrous cycle. Twenty-five percent of cycling heifers will not be expected to respond to a single PGF treatment because they have ovulated within five days and have a young CL that is not affected by PGF.

The remaining 20% of cycling heifers within a group *would appear* to respond to PGF administration by expressing heat within one to four days, but they would actually be responding to natural, spontaneous CL regression. They would have displayed estrus in one to four days regardless of PGF treatment.

Because of the heifers that undergo CL destruction due to the PGF treatment, plus the heifers that are undergoing spontaneous CL regression, 75% of the cycling heifers in a group should display estrus and should ovulate a fertile egg within 96 hours of a single PGF injection. Several management strategies can be used to increase the percentage of heifers that respond within 96 hours of PGF treatment so they will come into heat within a predetermined time frame that is convenient for the producer.

■ Strategy 1

One strategy is to observe the heifers for five or more days and to identify those that display indications of estrus. Identified heifers are bred artificially 12 hours after first being detected in estrus. At the end of the five-day observation period, the remaining heifers are treated with PGF. At this time, one should feel confident that the remaining cycling heifers are past the fifth day of the estrous cycle, and when injected with PGF they should either have a CL that will respond to it or will be at a stage in the estrous cycle that is undergoing



spontaneous CL regression. Observation for estrous behavior is continued for at least 96 hours with insemination occurring 12 hours after first detection of estrus.

The advantage of this system is that use of PGF is minimized because only heifers likely to respond are injected. The disadvantage is that the length of time committed to detecting estrus and performing AI is at least nine days.

■ Strategy 2

Another strategy is to inject all heifers in the group with PGF and observe the heifers for indications of estrus for 96 hours. Any heifer displaying signs of estrus is identified and bred artificially 12 hours after first detection of estrous behavior.

Heifers that are in the first five days of the estrous cycle are not expected to respond to the PGF treatment. Therefore, in order to have an opportunity to breed those heifers and any heifers that were not detected in estrus but that ovulated at a time consistent with the initial PGF injection, a second injection of PGF is given 11-14 days after the first. Again, heifers are

observed for estrous behavior for 96 hours after PGF treatment. Any heifer displaying signs of estrus is identified and bred artificially 12 hours after first detection of estrous behavior.

One advantage of this system is that the length of time committed to the program is reduced to eight days. The other advantage is that the second injection allows a second chance to breed artificially those heifers that are cycling but that failed to respond to the PGF treatment or were not detected in estrus.

■ Strategy 3

The final strategy that is commonly used involves two injections of PGF administered 11-14 days apart. No estrous detection or breeding is done after the first injection. All heifers, regardless of whether they responded to the first treatment, are given the second injection. The 75% of cycling heifers that should respond to the first injection within 96 hours are between the 7th and 15th days of the estrous cycle at the time of the second injection. The 25% of cycling heifers that are not expected to respond to the first injection because they have young CLs (less than five days past ovulation) are between the 11th and 16th days of the estrous cycle at the second injection. Therefore, by using two

injections, 100% of the heifers should be at a stage of the estrous cycle that will allow them to respond to the second PGF injection. For 96 hours after the second injection, the heifers should be observed for indications of estrous behavior, inseminating 12 hours after observed heat.

The advantage of this system is that only four days are required for estrous detection and AI. The disadvantage is the increased cost, labor and management because all the heifers are handled twice for PGF injections and once for insemination.

■ Timed trade-off

Timed insemination, or breeding at a preset appointment 80 hours after the second PGF injection regardless of estrous response, has been described. Conception rates are lower, however, than if heifers are bred only if detected in estrus. Therefore, you should either not use timed insemination following treatments with PGF alone, or you should expect lower pregnancy rates compared to insemination following detected estrus.



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