

ESTRUS SYNCHRONIZATION OF CATTLE USING ELEVEN DAY OR FOURTEEN DAY PROSTAGLANDIN PROTOCOLS

G.E. Selk¹, M.S. Fink² and C.A. McPeake³

Story in Brief

Forty-two beef replacement heifers were used to compare synchronization regimes. Two injections of prostaglandin F2a were given at 11 day or 14 day intervals. Heifers were observed twice daily for standing heat and were inseminated 12 hours after they were first observed in standing estrus. Estrous detection and artificial insemination were continued for another 45 days and used to determine the percentage of heifers that returned to estrus after the initial insemination. No difference in mean days to time of insemination, synchrony of insemination time, or in first service non-return rate was found. A fourteen day protocol of two prostaglandin injections should be expected to give similar estrous synchronization and conception rates to that found with the more commonly used eleven day system.

(Key words: Beef heifers, synchronization, prostaglandin)

Introduction

One of the primary methods of estrous synchronization available for beef producers is use of prostaglandin injections. Recent developments in endocrinology have revealed a series of hormone-like substances called prostaglandins (or prostaglandin analogs) that are highly effective in synchronizing estrus under certain conditions. They act by causing the corpus luteum to regress, thereby allowing the cow to begin a new estrous cycle. For this to be accomplished the following conditions must be met: 1) the cow must be cycling and 2) the cow must have a functional corpus luteum (between days 5 and 18 of the cycle). Prostaglandins do not cause non-cycling cows to come into heat. Their only function is to cause regression of a functional corpus luteum.

When management has been good, prostaglandins have greatly reduced the labor and expense of A.I. The period of time during which estrus must be detected is greatly reduced or eliminated entirely depending on the management system adapted. Three basic schemes have been used.

1. Two injections are given, 11 days apart. Any cyclic cow not having a corpus luteum (CL) that can be regressed by prostaglandin at the time the first injection is given, should have a CL at the time of the second injection, 11 days later. Cows are either bred upon detection of estrus or at 75 to 80 hours after the 2nd injection regardless of estrus.

Some experienced inseminators breed potential problem cows twice -- once at 72 hours after prostaglandin and again at 96 hours after the injection. This will increase labor and semen costs but has been shown to be effective with some problem breeders.

¹Assistant Professor ²Beef Herdsman ³Associate Professor

2. Cattle are detected in estrus and inseminated for at least 4 days and on the morning of the 5th day all cattle not detected in estrus or inseminated are injected. Breeding continues according to estrus for another 4 or 5 days.

3. Prostaglandin is injected and cows are inseminated at detected estrus for about 5 days. Cows in the first 5 days of their cycle at the time of injection will not be synchronized.

The choice of system depends on costs, labor, facilities and the amount of time the cattleman wants to devote to breeding. Success requires a cow herd with a close calving interval, good nutrition, good facilities, good semen, a good inseminator and good heat detection, if heat detection is used.

In the application of the first scheme, some producers choose to change the protocol from 11 days to a few days fewer or more between injections. Off-farm employment and impending bad weather are both possible reasons for changing the 11 day system to 14 days between injections. This allows for both injections to be given on the same day of the week to fit more conveniently into work schedules. A producer may want to avoid giving the second injection during or just before a severe winter storm and choose to wait three more days for better weather. With these possible scenarios in mind, a study was conducted to compare the estrus synchronization properties of two prostaglandin injections given 11 days apart versus two injections given 14 days apart. Cattle that receive the injections 14 days apart will have more mature corpora lutea to regress at the second treatment that may improve the effectiveness of the synchronization program.

Materials and Methods

Forty-two replacement beef heifers (of six different breeds) were blocked into two groups for synchronization of estrus. Twenty-one heifers (Treatment group) were injected with 25 mg of prostaglandin F2a (Lutalyse⁴) on April 10. The Control heifers (n = 21) were given an injection of prostaglandin F2a on April 13. All heifers were given a second injection of the prostaglandin on April 24. Consequently, the Treatment heifers were given two injections 14 days apart. All heifers were observed for signs of estrus twice each day for six days following the last injection. Estrous observations were conducted in early morning (7:00am) and at dusk (7:00pm). Only heifers that responded with observable estrus within 6 days after the second injection were included in the study. Any heifer observed in standing estrus was artificially inseminated at the next estrus observation period (approximately 12 hours later). The times of inseminations were recorded as AM or PM breedings and are shown graphically in figure 1. For example a heifer that was inseminated on the morning of the third day after the injection would be listed as 3.0 days, where as a heifer inseminated in the evening on the same day would be recorded as 3.5 days after the second injection. All heifers were observed for estrus for 45 days after the second injection of prostaglandin. Those that did not return to estrus in this time period were assumed to have conceived. Conception was verified by subsequent calving.

⁴Product of Upjohn Co., Kalamazoo, Michigan.

Analysis of variance was used to determine differences between groups for mean time to insemination. Chi-square analysis was used to determine difference in non-return rate, and Bartlett's test of homogeneity of variance was used to determine differences in synchrony of inseminations between the two groups.

Results and Discussion

Changing the interval between the first and second treatments with prostaglandin from 11 to 14 days did not significantly affect the average number of days from injection to onset of estrus and time of insemination (Table 1). Also the synchrony of the estrus was unaffected as the variability of time of insemination after treatment with prostaglandin was similar for the two groups. No difference in pregnancy rate was found. Seventy-one percent of the heifers in both groups conceived.

The distribution of the times of inseminations are illustrated in Figure 1. The cow that was observed in estrus on the second day probably did not respond to the first injection of prostaglandin because she was in the early part of her cycle and would have been late in her estrous cycle and was unaffected by the second injection of prostaglandin. This illustrates that producers that use the 14 day system must heat check from the time of injection through the six days of possible synchronized heats. A slight tendency for some cows in the 14 day group to exhibit heat slightly later than the 11 day cows perhaps is caused by the more mature corpora lutea that take longer to regress.

The study illustrated that 14 day injection programs can be conducted with similar results to those for the commonly used 11 day protocol. Both programs should be more efficient if cows are inseminated after observed estrus. The variability of onset of estrus, though not different between groups, was sufficiently large to make timed inseminations risky.

Table 1. Means and standard deviations of the number of days from second prostaglandin injection to insemination, and non-return rates for heifers given two prostaglandin injection 11 days or 14 days apart.

Days between injections	Mean Days to Insemination	Standard of Deviation of Days to Insemination	Percent Non-return Rate
11 (n = 21)	3.74	1.04	15/21 (71%)
14 (n = 21)	3.95	1.05	15/21 (71%)

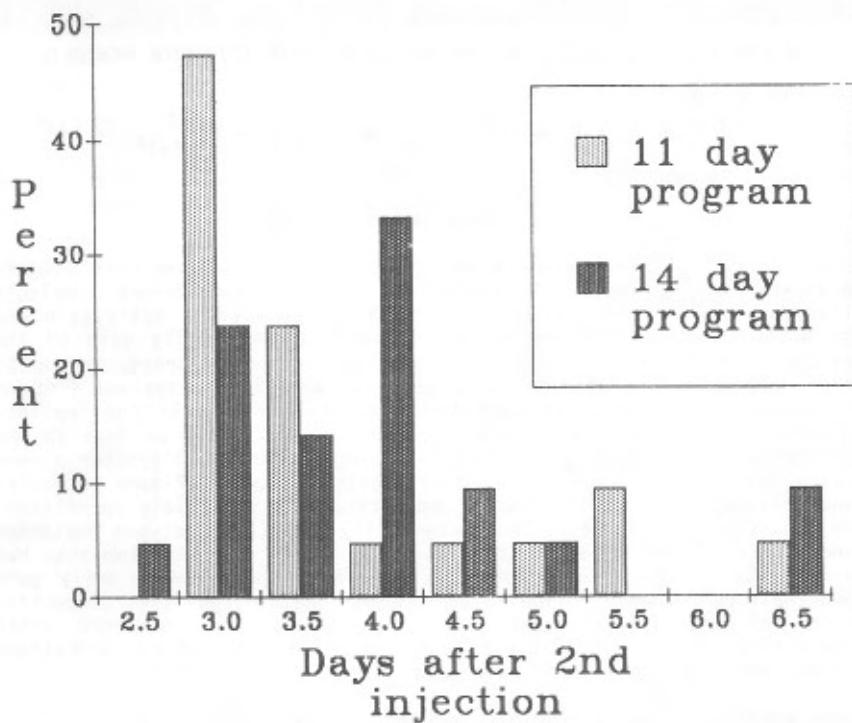


Figure 1. Percentage of heifers inseminated at half day intervals following a second injection of PGF2a that was given 11 or 14 days after a previous injection.