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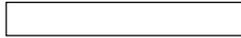
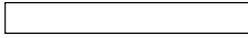
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# Refinement of the MGA/PGF Synchronization Program for Heifers Using a 19-day PGF Injection

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**Doug O'Hare<sup>1</sup>**

When the MGA/PGF synchronization program was used on heifers, giving the PGF injection on day 19 improved cycling response and pregnancy rates during a 5-day period.

*heat detected and bred by AI using semen from one sire. The Day 19 PGF injection caused a higher (16%) percentage of heifers to cycle by 72 hours after injection, a higher (6%) percentage of heifers to cycle during the 5-day breeding period, and higher pregnancy rates in 5 days (8%) and in 50 days (5%) than heifers given PGF on Day 17. Similar results were found on a cooperating ranch using 1400 heifers.*

synchronization and AI may become more popular.

Estrous synchronization programs are needed to achieve high conception rates during a short time period at low costs. The MGA/PGF program has the advantages of ease of administration, induction of estrus in some prepuberal heifers and low cost. However, can it be improved? If heifers are in the late luteal phase of their estrous cycle at the time of PGF injection, a greater percentage of them may show estrus with higher pregnancy rates.

The objective of this study was to compare the effects of giving the PGF injection on Day 19 versus Day 17 after the MGA feeding period (which is the standard procedure) on estrous response, conception rates and overall pregnancy rates of yearling heifers.

## Summary

*A two-year study was conducted on 240 yearling heifers to refine the MGA/PGF synchronization program by using a 19-day PGF injection. All heifers were fed MGA for 14 days and received PGF injection on either Day 17 or Day 19 after the MGA period. Heifers were*

## Introduction

Proper management of replacement heifers is critical for increasing herd productivity and profitability. Estrous synchronization and AI programs can increase the percentage of heifers bred early in the first breeding season and improve overall reproductive performance. With the advent of commercially available sexed semen in the future, heifer

## Procedure

This study was conducted over two years with 240 crossbred yearling heifers (140 in 1997 and 100 in 1998) at the West Central Research and Extension Center, North Platte. Heifers were managed in drylot and fed ground alfalfa hay, corn silage, and corn to reach prebreeding target weights of about 775 pounds.

Two blood samples were collected 10 days apart for serum progesterone levels before MGA feeding to determine puberty status. All heifers were fed MGA at .5 mg per head per day with ration in a feed bunk for 14 days. After the MGA feeding period, heifers were observed for standing estrus during the next eight days. This estrus was used to randomly assign the heifers to two treatment groups according to day of estrus for equal distribution. This estrus was also used to calculate the day of the estrous cycle for each heifer at time of PGF injection. Heifers in Group A were given the PGF (Lutalyse) injection on Day 17 after the MGA feeding period and heifers in Group B received the PGF injection on Day 19. Heifers were heat detected and bred using AI for five days after each injection. They were bred according to the AM-PM rule (12 hrs after standing estrus) using semen from one Angus sire each year. Three AI technicians were used each year and inseminated equal numbers of heifers in each treatment group. Figure 1 shows the experimental protocol.

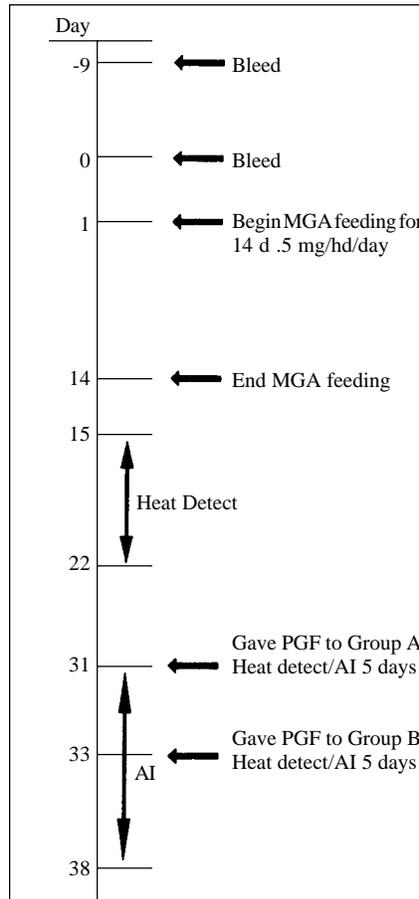


Figure 1. Outline of study procedure.

Angus bulls were placed with the heifers seven days after the AI period for a total 50-day breeding season. In 1997, the heifers were palpated twice for fetal age to determine day of conception which was confirmed by calving date. In 1998, ultrasound was used to determine day of AI conception and a pregnancy exam

determined total pregnancy rate. Cycling and pregnancy rate data were analyzed by Chi-Square analyses.

A similar study was conducted in 1998 on a cooperating ranch (O'Hare Ranch, Ainsworth, NE) which compared the same two treatments using over 1400 heifers. All heifers were in drylots and fed MGA for 14 days. They then were divided into two groups and received the PGF injection at either 17 or 19 days. Heifers were heat detected and bred by AI on the AM-PM rule for 10 days. For this report, only the data on the first five days after each PGF injection were used. Heifers were also heat detected and bred by AI on their second cycle for a total 30-day breeding season. Day of conception was determined by ultrasound procedures. All data were analyzed by Chi-Square analyses.

## Results

Results were similar for both years of the University study, so data were pooled. Table 1 shows the two-year summary. Similar percentages of heifers were cycling in both treatment groups before and after MGA feeding. A greater percentage of heifers in the 19-day group exhibited estrus during the five-day synchronization period than those in the 17-day group (92.4 vs. 86.7%, respectively,  $P < .17$ ). First service conception rates also tended to be higher (5.1%) for the 19-day group of heifers, although not statistically significant. Percentage of heifers pregnant in the five-day AI period and in 50 days of breeding were higher (7.9% and 5.0%, respectively) for heifers in the 19-day group compared to the 17-day group. Even though these percentages were not statistically significant ( $P > .10$ ), they may be biologically and economically significant and were confirmed by the results from the O'Hare Ranch study (Table 4).

The timing of estrus after PGF injection is shown in Table 2. A higher ( $P < .05$ ) percentage of heifers in the 19-day group were in estrus by 72 hours after PGF than heifers in the 17-day group (70% vs. 54%). By 84 hours after PGF, 82% of the 19-day group had shown estrus. No heifers in the 19-day group

(Continued on next page)

Table 1. Comparison of PGF injections at 17 or 19 days in MGA/PGF synchronization program - two years.

| Trait                                      | PGF treatment group <sup>a</sup> |         |            |
|--|----------------------------------|---------|------------|
|  | 17 days                          | 19 days | Difference |
| No. of heifers                             | 120                              | 119     |            |
| Cycling before MGA <sup>b</sup> , %        | 76.7                             | 73.9    |            |
| Cycling after MGA feeding <sup>c</sup> , % | 94.2                             | 94.1    |            |
| Cycling during 5 days synch., %            | 86.7                             | 92.4    | +5.7*      |
| No. conceived in 5 days                    | 59                               | 68      |            |
| First service conception, %                | 56.7                             | 61.8    | +5.1       |
| Pregnant in 5 days of synch., %            | 49.2                             | 57.1    | +7.9**     |
| Pregnant in 50 days of breeding, %         | 88.3                             | 93.3    | +5.0**     |

<sup>a</sup>Heifers fed MGA for 14 days then received PGF on assigned day. Heifers were heat detected and AI bred on AM-PM rule with semen from one sire.

<sup>b</sup>Cycling status determined by blood progesterone levels.

<sup>c</sup>Cycling determined by detection of standing estrus.

\* ( $P < .17$ )

\*\* ( $P < .20$ )

**Table 2. Heifers in estrus after PGF injection by treatment group - two years.**

| Estrus after injection | PGF treatment group            |   |
|------------------------|--------------------------------|---|
|                        | 17 day<br>No. (%) <sup>b</sup> | 19 day <sup>a</sup><br>No. (%) <sup>b</sup> |
| 48 hrs                 | 8 (7)                          | 17 (14)                                     |
| 60 hrs                 | 37 (38) <sup>e</sup>           | 42 (50) <sup>f</sup>                        |
| 72 hrs                 | 20 (54) <sup>c</sup>           | 24 (70) <sup>d</sup>                        |
| 84 hrs                 | 23 (73) <sup>e</sup>           | 15 (82) <sup>f</sup>                        |
| 96 hrs                 | 8 (80) <sup>e</sup>            | 7 (88) <sup>f</sup>                         |
| 120 hrs                | 8 (87)                         | 5 (92)                                      |

<sup>a</sup>None of heifers in estrus before injection.

<sup>b</sup>Accumulated % of total in group.

<sup>c,d</sup>Treatments differ (P<.05).

<sup>e,f</sup>Treatments differ (P<.10).

were detected in estrus before the PGF injection, although about 1% did have a standing heat by 12 hours after the injection. These results indicate heifers in the 19-day group came into estrus earlier, so heat detection should begin at injection time. Heifers in estrus at injection time or shortly after are fertile and should be bred using the AM-PM rule.

Table 3 shows the effects of the day of cycle that the heifers were in at the time of PGF injection on AI conception rates. In general, heifers in the later stages of their estrous cycles had higher conception rates. Day of cycle was grouped into Late CL, Med CL, and Early CL subgroups. Fifty-three percent of the 19-day group were in the Late CL subgroup compared to only 2% of the 17-day group. The Late CL subgroup had the highest AI conception rate (67%). This helps explain why the heifers in the 19-day group had higher conception and pregnancy rates. The Early CL subgroup had 30% of the heifers in the 17-day group and only 5% of the heifers in the 19-day group. This subgroup had the lowest (P < .07) conception rate (43%). This also supports the higher pregnancy rates for the heifers in the 19-day group.

Table 4 shows a summary of the results from the cooperating heifer development operation (O'Hare Ranch) which compared the same two treat-

ments. During the five-day synchronization period, 10% more heifers in the 19-day group exhibited estrus with a 7.6% higher pregnancy rate for this group (P < .05) compared to the 17-day group. Also, pregnancy rate after 30 days of breeding was 5.5% higher (P < .05) for the 19-day group. These results are similar to those of the University study and confirm the advantages of the 19-day procedure.

The heifers on this ranch also responded to the PGF injections with a significantly higher percentage of the 19-day group in estrus by 84 hours after PGF compared to the 17-day group (82% vs. 67%, respectively; P < .05). This indicates an earlier and tighter synchronization period. However, a few heifers (1.5%) were in estrus within 12 hours after the PGF injection, so early heat detection is needed.

The results of these studies indicate the following advantages for the 19-day PGF injection procedure:

1. A higher percentage of heifers cycled during the five-day synchronization period (6 to 10%).
2. A higher percentage of heifers (16%) cycled by 72 hours after PGF and up to a total of 82% cycled by 84 hours.
3. First service conception rates were as high or higher than for the 17-day group.
4. Percentage of heifers pregnant in 5 days and total pregnancy rates were higher (5 to 8%) for the 19-day group.
5. Considerably more heifers (50%) were in the late CL stage of their estrous cycle at PGF and were more fertile.
6. University results were confirmed by a field study on 1400 heifers on a cooperating ranch.

**Table 3. Effects of day of cycle when PGF injection given on AI conception rate-two years.<sup>a</sup>**

| Day of cycle              | Treatment groups         |                          |                                    |
|---------------------------|--------------------------|--------------------------|------------------------------------|
|                           | 17-day<br>No. of heifers | 19-day<br>No. of heifers | Total conception <sup>c</sup><br>% |
| 17                        | —                        | 2                        | 100                                |
| 16                        | —                        | 25                       | 72                                 |
| 15                        | 2                        | 28                       | 60                                 |
| Late CL <sup>b</sup> (%)  | (2) <sup>d</sup>         | (53) <sup>e</sup>        | 67 <sup>f</sup>                    |
| 14                        | 23                       | 21                       | 59                                 |
| 13                        | 23                       | 15                       | 66                                 |
| 12                        | 21                       | 7                        | 57                                 |
| Med CL <sup>b</sup> (%)   | (68) <sup>d</sup>        | (42) <sup>e</sup>        | 61 <sup>f</sup>                    |
| 11                        | 18                       | 3                        | 43                                 |
| 10                        | 6                        | 1                        | 43                                 |
| 7-8-9                     | 6                        | 1                        | 43                                 |
| Early CL <sup>b</sup> (%) | (30) <sup>d</sup>        | (5) <sup>e</sup>         | 43 <sup>g</sup>                    |

<sup>a</sup>Number of heifers in each day of their estrous cycle when PGF given and AI conception rates for each day of cycle.

<sup>b</sup>Estrous cycle separated into three subgroups with percentage of heifers in each.

<sup>c</sup>Conception percent for each day of cycle and each subgroup.

<sup>d,e</sup>Subgroup percentages differ by treatments (P < .01).

<sup>f,g</sup>Subgroup percentages differ on percent conception (P < .07).

**Table 4. Comparison of PGF injections at 17 or 19 days in MGA/PGF program on O'Hare Ranch.**

| Trait                              | PGF treatment group <sup>a</sup> |         |            |
|------------------------------------|----------------------------------|---------|------------|
|                                    | 17 days                          | 19 days | Difference |
| No. of heifers                     | 723                              | 686     |            |
| Cycling during 5 days synch., %    | 77.6                             | 87.6    | + 10*      |
| No. conceived in 5 days            | 389                              | 421     |            |
| First service conception, %        | 69.3                             | 70.0    | + 0.7      |
| Pregnant in 5 days, %              | 53.8                             | 61.4    | + 7.6*     |
| Pregnant in 30 days of breeding, % | 72.3                             | 77.8    | + 5.5*     |

<sup>a</sup>Heifers fed MGA for 14 days, then received PGF on assigned day. Heifers were heat detected and AI bred on AM-PM rule.

\* (P < .05).

<sup>1</sup>Gene Deutscher, professor, Rex Davis, beef unit manager, Dave Colburn, former research technician, Animal Science; West Central Research and Extension Center, North Platte. Doug O'Hare, Ainsworth, NE, conducted cooperative study on his heifer development operation.