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SUCCESS OF SEVERAL PROGRAMMED AI-BREEDING PROTOCOLS INCLUDING OVSYNCH

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Summary

In Experiment 1, four programmed AI-breeding treatments were tested. The so-called OvSynch program, which requires no heat detection before a fixed-time insemination, decreased conception rates compared with a similar treatment in which inseminations occurred after detected estrus (30 vs 51%). The traditional two-injection prostaglandin program produced greater conception rate for cattle inseminated after a detected estrus (53%) than after one fixed-time insemination was given in the absence of estrus (31%). A similar protocol of two prostaglandin injections plus an injection of gonadotropin-releasing hormone (GnRH or Cystorelin®) before one fixed-time insemination produced lower conception rates (33%) than when cattle were inseminated after detected estrus (53%). In Experiment 2, the OvSynch program was retested with the interval between the $PGF_{2\alpha}$ and the second GnRH injection being 48 hr (36 hr in Experiment 1). Conception in 27 cows on the OvSynch48 program with timed insemination (37%) was comparable with 43% in 21 cows on a similar program without the second GnRH injection but inseminated at estrus.

(Key Words: OvSynch, Synchronized Estrus, Conception Rates.)

Introduction

Since prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) was demonstrated to be effective in controlling the estrous cycle for programmed breeding, attempts to develop estrus-synchronization systems for lactating dairy cows and dairy heifers to accommodate fixed-time inseminations have met with limited success. Conception rates following $PGF_{2\alpha}$ usually produced the best results when inseminations were performed after observed signs of heat. Our early attempts to use fixed-time inseminations at first services in lactating dairy cows demonstrated that conception rates were less than desirable.

Follicular development must be controlled and synchronized with the regression of the corpus luteum after $PGF_{2\alpha}$ in order to reduce variation in the intervals to estrus. Precise control of follicular development with the regression of the corpus luteum should allow improved conception rates associated with one fixed-time insemination. Such a synchronized ovulation protocol (OvSynch) has been tested. A first injection of GnRH is administered 7 days before $PGF_{2\alpha}$, and a second injection of GnRH is given 36 to 48 hr after $PGF_{2\alpha}$ to cause ovulation of the dominant follicle via GnRH-induced release of luteinizing hormone (LH). The objective of this study was to compare conception rates achieved in heifers and lactating cows using two versions of the OvSynch AI-breeding protocol with a standard two-injection, prostaglandin protocol commonly used on dairy farms.

Procedures

Experiment 1. Four treatments were used (Figure 1). Treatments A and B were similar. One injection of GnRH (100 µg of Cystorelin®) was given 7 days before one injection of $PGF_{2\alpha}$ (25 mg of Lutalyse®). In treatment A, cattle received a second injection of GnRH 36 hr after $PGF_{2\alpha}$ and then received one fixed-time insemination 18 hr later, whereas cattle in treatment B were inseminated according to the AM-PM rule at the detected estrus after $PGF_{2\alpha}$.

Treatments C and D were similar. All cattle received two injections of $PGF_{2\alpha}$ 14 days apart. In treatment C, cattle received one injection of GnRH 36 hr after the second injection of $PGF_{2\alpha}$ and received one fixed-time insemination 18 hr later. In the last treatment, cattle were inseminated at the detected estrus after $PGF_{2\alpha}$ according to the AM-PM rule, or in the absence of detected estrus, one fixed-time insemination was given at 72 (heifers) or 80 hr (cows) after the second $PGF_{2\alpha}$ injection.

Treatments were applied randomly to replacement heifers (minimum body weight of 800 lb and 12 months of age) and to lactating cows (minimum of 60 days in milk) before first services. Cow and heifers were grouped in 3-wk breeding clusters beginning in July, 1994, and the experiment continued until February, 1996. Conception rates were determined by palpation of the uterus and its contents between 38 and 52 days after insemination.

Experiment 2. Treatments A and B were repeated in lactating cows except that the second injection of GnRH was administered 48 hr after $PGF_{2\alpha}$ (Figure 2). Lactating cows (minimum of 60 days in milk) before first services were grouped in 3-wk breeding clusters beginning in March, 1996, and the experiment is ongoing. Conception rates were determined by palpation of the uterus and its contents between 38 and 52 days after insemination.

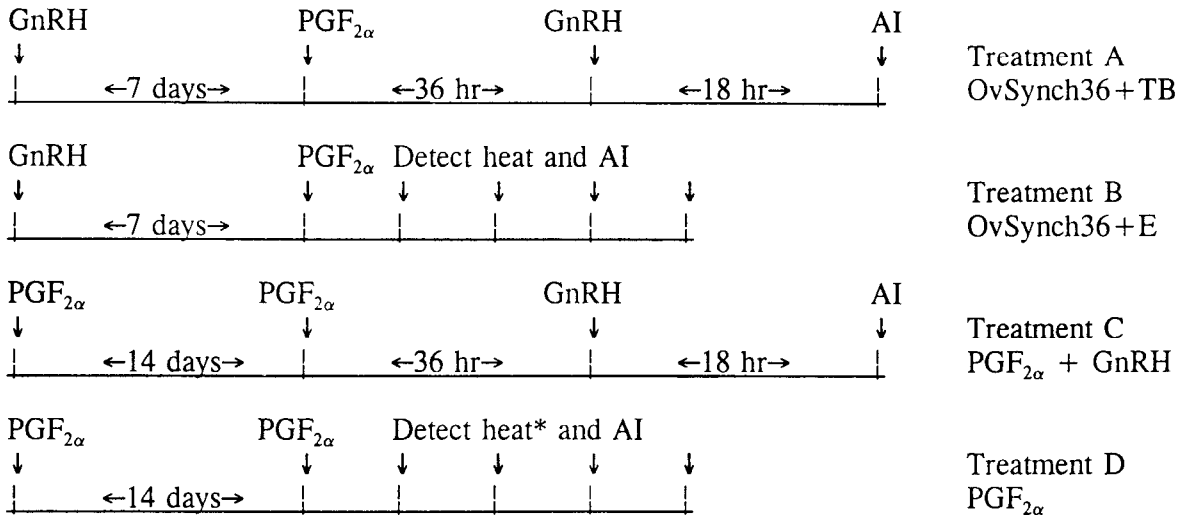
Results and Discussion

Experiment 1. Conception rates achieved in each of four treatments are summarized in Table 1. Conception rate after OvSynch36 + timed insemination was less (P=.01) than that after insemination at estrus (treatments A vs B). Conception rate after two injections of $PGF_{2\alpha}$ was greater (P<.01) when inseminations were performed at estrus (treatment D) than after one fixed-time insemination in which ovulation was induced by GnRH after the second $PGF_{2\alpha}$ injection (treatment C) or after one fixed-time insemination at 72 or 80 hr in the absence of detected estrus (treatment D).

Experiment 2. Although conception rates in lactating cows after OvSynch48 + timed insemination seem to be similar to those after a similar treatment + inseminations at estrus (Table 2), only a limited number of cows have been tested. Of 29 cows in the latter treatment, only 21 were detected in estrus during 5 days after $PGF_{2\alpha}$ (72% heat detection rate). Conception rate of the remaining 8 cows inseminated at estrus induced by another $PGF_{2\alpha}$ injection given 14 days was 37%. One advantage of the OvSynch protocol + timed insemination is that its success is independent of heat detection rate.

Conclusions

Recommended use of the OvSynch protocol is to administer GnRH on Monday, followed by $PGF_{2\alpha}$ on the following Monday at milking time (5 PM); the second GnRH injection at 5 PM on Wednesday (48 hr later); and inseminate cows on the next morning (Thursday) between 8 and 10 AM (Figure 2). If you do not want to use the timed insemination, give GnRH (Monday) and follow it with $PGF_{2\alpha}$ in 7 days (Monday) and watch for heat. For inseminations with this system, follow the AM-PM rule when heat is detected. Do not use this protocol in replacement heifers, because results are inferior to what can be achieved with a $PGF_{2\alpha}$ protocol.



*In absence of detected heat, heifers were inseminated at 72 hr and lactating cows at 80 hr after the second $PGF_{2\alpha}$ injection.

Figure 1. Treatment Protocols for Experiment 1.

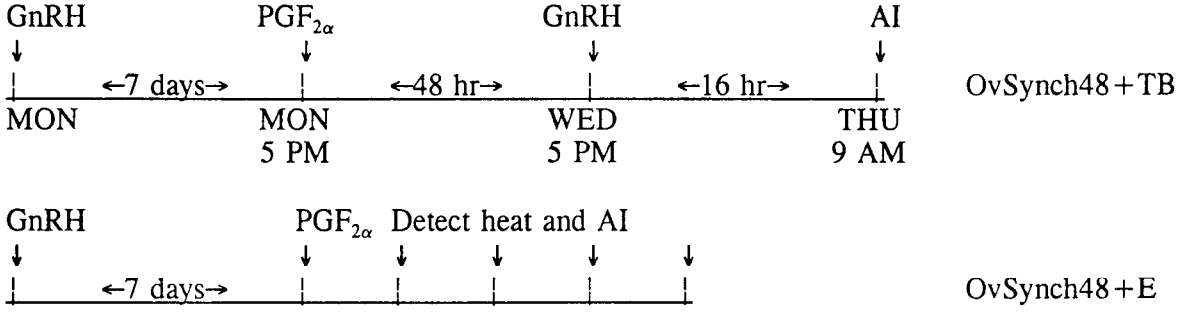


Figure 2. Treatment Protocols for OvSynch48 in Experiment 2.

Table 1. Conception Rates after Various Programmed AI-Breeding Treatments in Replacement Heifers and Lactating Cows (Experiment 1)

Treatment	No.	%
A: OvSynch36 + TB (AI at a fixed time)	98	30[a]
B: OvSynch36 + E (AI at estrus)	85	51
C: Two injections of $PGF_{2\alpha}$ + TB (AI at fixed time)	90	33
D: Two injections of $PGF_{2\alpha}$ (AI at estrus or at 72 or 80 hr)	148	42
AI at estrus	73	53[b]
AI at 72 or 80 hr	75	31[c]

[a]Different (P=.01) from treatment B.
[b]Different (P<.01) from treatment C.
[c]Different (P<.01) from treatment D (AI at estrus).

Table 2. Conception Rates after OvSynch48 in Lactating Cows (Experiment 2)

Treatment	No.	%
OvSynch48 + TB (AI at a fixed time)	27	37
OvSynch48 + E (AI at estrus)	21	43