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Comparison of synchronized-ovulation protocols and traditional synchronized-estrus programs using prostaglandin F2(α) (1995)

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COMPARISON OF SYNCHRONIZED-OVULATION PROTOCOLS AND TRADITIONAL SYNCHRONIZED-ESTRUS PROGRAMS USING PROSTAGLANDIN $F_{2\alpha}$

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Summary

Five treatments were developed to compare a new synchronized ovulation protocol, which programs follicular development with the regression of the corpus luteum, and traditional prostaglandin protocols that only control the regression of the corpus luteum. The synchronized ovulation treatment, which requires no heat detection before a fixed-time insemination, tended to decrease pregnancy rates compared to a similar synchronized ovulation treatment in which inseminations occurred at a detected estrus (30 vs 50%). The traditional two-injection prostaglandin protocol that synchronized estrus by regression of the corpus luteum had a greater pregnancy rate (57%) than similar two-injection prostaglandin protocols in which gonadotropin-releasing hormone (GnRH or Cystorelin®) was used to induce ovulation of the follicle before one fixed-time insemination (21%) or one fixed-time insemination was given in the absence of estrus (18%). The synchronized ovulation protocol improved pregnancy rates compared to prostaglandin protocols with fixed-time inseminations, but in either protocol, in which ovulation or estrus was synchronized, pregnancy rates were always greater when inseminations were performed after detected estrus.

(Key Words: Prostaglandin, Gonadotropin-Releasing Hormone, Synchronized Ovulation, Synchronized Estrus, Pregnancy Rates.)

Introduction

Attempts to develop estrus-synchronization systems for lactating dairy cows and dairy heifers to accommodate fixed-time inseminations have met with limited success, since prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) was demonstrated to be effective in controlling the estrous cycle for programmed breeding. Pregnancy rates following $PGF_{2\alpha}$ usually were best when inseminations were performed based on observed signs of heat. Our early attempts to use fixed-time inseminations at first services in lactating dairy cows demonstrated that pregnancy 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 pregnancy rates associated with one fixed-time insemination. Such a synchronized ovulation protocol was described in the accompanying article that uses GnRH to induce ovulation of the dominant follicle via release of luteinizing hormone (LH). The objective of this study was to compare pregnancy rates achieved in heifers and lactating cows using this new synchronized ovulation protocol to those achieved with a standard, two-injection, prostaglandin protocol commonly used on dairy farms.

Procedures

Five 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. Cattle in treatment B were inseminated ac-

cording to the AM-PM rule at the detected estrus after $PGF_{2\alpha}$.

Treatments C, D, and E 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 $PGF_{2\alpha}$ and received one fixed-time insemination 18 hr later. In the last two treatments, cattle were inseminated at the detected estrus after $PGF_{2\alpha}$ according to the AM-PM rule (treatment E), 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 (treatment D).

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-week breeding clusters beginning in July, 1994, and the experiment continued until July, 1995. Pregnancy rates were determined by palpation of the uterus and its contents between 38 and 52 days after insemination.

Results and Discussion

Pregnancy rates achieved in each of five treatments are summarized in Table 1. Pregnancy rate after synchronized ovulation tended (P = .12) to be greater when inseminations were performed at estrus than after one fixed-time insemination (treatments A vs B). Pregnancy rate after synchronized estrus with $PGF_{2\alpha}$ was greater (P <.0l) when inseminations were performed at estrus (treatment E) 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).

These results indicate that the synchronixed ovulation protocol seems to improve pregnancy rates compared to prostaglandin protocols with fixed-time inseminations, but in either protocol, in which ovulation or estrus is synchronized, pregnancy rates are always greater when inseminations are performed after a detected estrus.

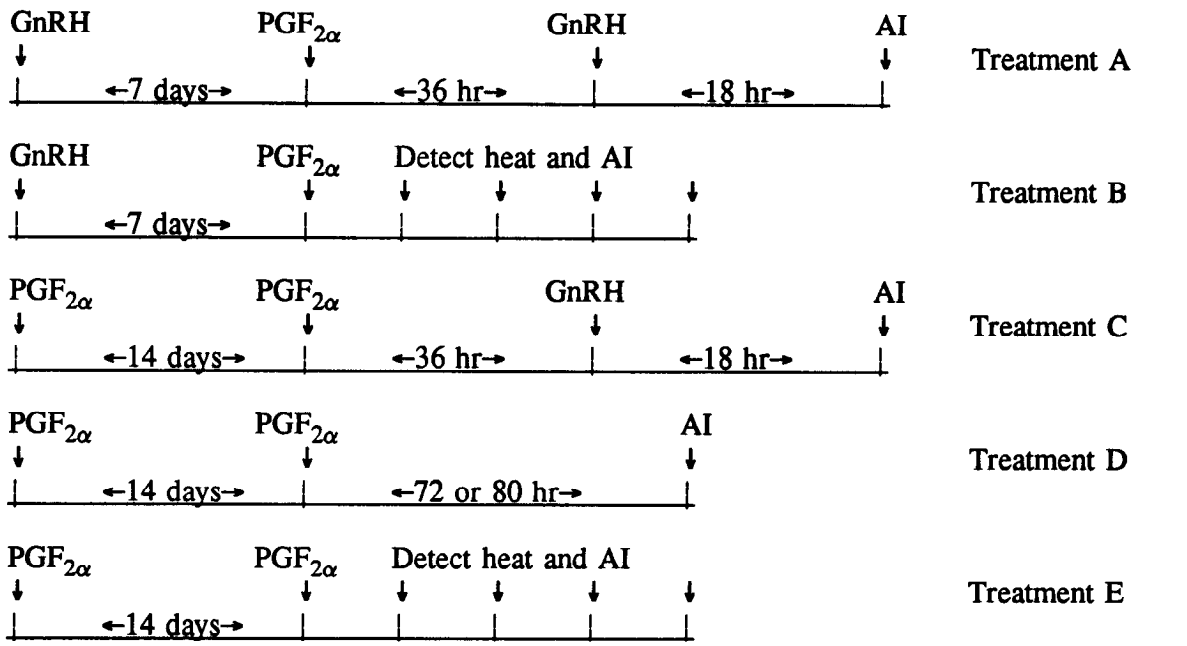

Figure 1. Treatment Protocols A, B, C, D, and E

Table 1. Pregnancy Rates after Synchronized Ovulation Compared with Synchronized Estrus

Treatment	Pregnancy rates No./no.	Pregnancy rates %
A: Synchronized ovulation + A.I. at a fixed time	19/63	30.2[a]
B: Synchronized ovulation + A.I. at estrus	9/18	50.0
C: Synchronized estrus + GnRH + A.I. at fixed time	12/54	20.8[b]
D: Synchronized estrus + A.I. at 72 or 80 hr	8/44	18.2[b]
E: Synchronized estrus + A.I. at estrus	47/83	56.6

[a]Tended (P = .12) to differ from treatment B.
[b]Different (P<.01) from treatment E.