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

Y. Kobayashi

Jeffrey S. Stevenson

Follow this and additional works at: https://newprairiepress.org/kaesrr

Part of the Dairy Science Commons

Recommended Citation
Kobayashi, Y. and Stevenson, Jeffrey S. (1995) "Comparison of synchronized-ovulation protocols and traditional synchronized-estrus programs using prostaglandin F2(α)," Kansas Agricultural Experiment Station Research Reports: Vol. 0: Iss. 2. https://doi.org/10.4148/2378-5977.3264

This report is brought to you for free and open access by New Prairie Press. It has been accepted for inclusion in Kansas Agricultural Experiment Station Research Reports by an authorized administrator of New Prairie Press. Copyright 1995 Kansas State University Agricultural Experiment Station and Cooperative Extension Service. Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned. K-State Research and Extension is an equal opportunity provider and employer.
Comparison of synchronized-ovulation protocols and traditional synchronized-estrus programs using prostaglandin F2(α)

Abstract
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.; Dairy Day, 1995, Kansas State University, Manhattan, KS, 1995;

Keywords
Dairy Day, 1995; Kansas Agricultural Experiment Station contribution; no. 96-106-S; Report of progress (Kansas Agricultural Experiment Station and Cooperative Extension Service); 742; Prostaglandin; Gonadotropin-releasing hormone; Sychronzied ovulation; synchronized estrus; Pregnancy rates

Creative Commons License
This work is licensed under a Creative Commons Attribution 4.0 License.
COMPARISON OF SYNCHRONIZED-OVULATION PROTOCOLS AND TRADITIONAL SYNCHRONIZED-ESTRUS PROGRAMS USING PROSTAGLANDIN F$_{2\alpha}$

J. S. Stevenson and Y. Kobayashi

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-
According 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 < .01) 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 synchronized 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.

| GnRH            | PGF$_{2\alpha}$ | GnRH | AI       |
|-----------------|-----------------|------|----------|
| 7 days          | 36 hr           | 18 hr|          |

Treatment A

| GnRH            | PGF$_{2\alpha}$ | Detect heat and AI |
|-----------------|-----------------|---------------------|
| 7 days          |                  |                     |

Treatment B

| PGF$_{2\alpha}$ | PGF$_{2\alpha}$ | GnRH | AI       |
|-----------------|-----------------|------|----------|
| 14 days         | 36 hr           | 18 hr|          |

Treatment C

| PGF$_{2\alpha}$ | PGF$_{2\alpha}$ | AI   |
|-----------------|-----------------|------|
| 14 days         | 72 or 80 hr     |      |

Treatment D

| PGF$_{2\alpha}$ | PGF$_{2\alpha}$ | Detect heat and AI |
|-----------------|-----------------|---------------------|
| 14 days         |                  |                     |

Treatment E

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. | %    |
|-----------------------------------------------------|-------------------------|------|
| A: Synchronized ovulation + A.I. at a fixed time    | 19/63                   | 30.2a|
| B: Synchronized ovulation + A.I. at estrus          | 9/18                    | 50.0 |
| C: Synchronized estrus + GnRH + A.I. at fixed time  | 12/54                   | 20.8b|
| D: Synchronized estrus + A.I. at 72 or 80 hr        | 8/44                    | 18.2b|
| 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.