

Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 2 *Dairy Research (1984-2014)*

Article 361

1994

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Recommended Citation

Kobayashi, Y. and Stevenson, Jeffrey S. (1994) "Use of GnRH and PGF for synchronized ovulation and fixed-time inseminations," *Kansas Agricultural Experiment Station Research Reports*: Vol. 0: Iss. 2. <https://doi.org/10.4148/2378-5977.3286>

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USE OF GnRH AND PGF_{2α} FOR SYNCHRONIZED OVULATION AND FIXED-TIME INSEMINATIONS

J. S. Stevenson and Y. Kobayashi

Summary

Holstein cows and virgin heifers were treated with GnRH and PGF_{2α} in a novel ovulation synchronization protocol, which involves one fixed-time insemination. One injection of GnRH is given on a Monday morning, followed in 7 days with an injection of PGF_{2α}. Approximately 32 hr later, ovulation is induced with a second injection of GnRH, and one insemination is made 18 hr later. Control cattle were given one injection of PGF_{2α} and inseminated at estrus. Pregnancy rates measured between 28 and 35 days after insemination by ultrasonography were slightly, but not significantly, higher in controls (52.9%) than in the ovulation synchronization treatment (44.3%). This treatment may be particularly well suited to cows in which estrus is rarely observed, as well as for synchronizing first or repeat services.

(Key Words: PGF_{2α}, GnRH, Ovulation Synchronization, Pregnancy Rates.)

Introduction

Since the discovery of the luteolytic properties of prostaglandin F_{2α} and the introduction of Lutalyse® in 1979, programs to synchronize estrus for insemination have evolved. Many of the early attempts to use PGF_{2α} in lactating dairy cows demonstrated its effectiveness in controlling the estrous cycle for programmed breeding. Pregnancy rates following PGF_{2α} usually produced the best results 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. Using two injections of PGF_{2α} given 11 days apart, we found that

pregnancy rates averaged 23% when one fixed-time insemination was administered at 80 hr after the second injection, whereas pregnancy rates improved slightly to about 30% when the 80-hr insemination was preceded 8 hr earlier by 100 µg of GnRH or when two fixed-time inseminations were given at 72 and 96 hr after the second injection of PGF_{2α}. Pregnancy rates in control cows inseminated at estrus were 51% in that study.

Recent work has demonstrated that controlling follicular growth relative to the termination of the corpus luteum with PGF_{2α} may improve pregnancy rates associated with one fixed-time insemination. An injection of GnRH during the estrous cycle in lactating cows will either induce luteinization or ovulation of a large (dominant) follicle via GnRH-induced release of luteinizing hormone (LH). As a result of such treatment, a new group of antral follicles begins to grow, and one becomes dominant and then is fully capable of ovulation within 6 or 7 days after the injection of GnRH. When an injection of PGF_{2α} is administered 6 or 7 days after GnRH, this freshly developed dominant follicle can be induced to ovulate with a second injection of GnRH before one fixed-time insemination is given. The objective of our study was to determine pregnancy rates in heifers and lactating cows following the use of this synchronized ovulation protocol.

Procedures

A novel ovulation synchronization treatment was compared to a treatment using one injection of PGF_{2α}. Treatments were applied

to virgin heifers (minimum body weight of 800 lb and 13 months of age) and to lactating cows (minimum of 60 days in milk) before first and repeat services. The two treatments utilized are illustrated in Figure 1.

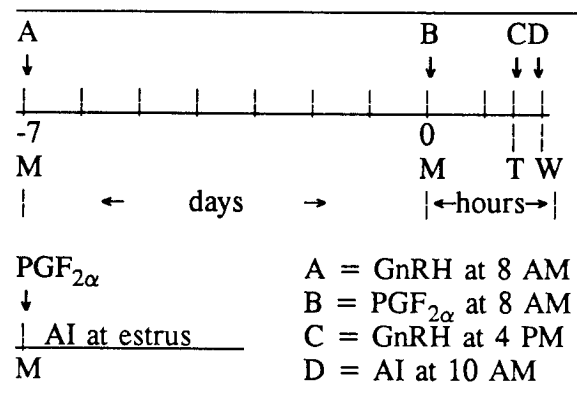


Figure 1. Ovulation Protocol

The ovulation synchronization treatment (top of figure) consisted of one 100 μ g injection of GnRH (Cystorelin®) on a Monday morning followed 7 days later with one 25 mg injection of PGF_{2α} (Lutalyse®). Then, 32 h after PGF_{2α}, a second 100- μ g injection of GnRH was given to induce the preovulatory release of LH, which induced ovulation in about 24 to 32 h. Cows were given one fixed-time insemination 18 hr after the

second injection of GnRH. The specific hours of injections are listed in Figure 1. The control cattle (bottom of figure) received 25 mg of PGF_{2α} and were inseminated when detected in estrus. Pregnancy diagnoses were made by transrectal ultrasonography between days 28 and 35 after insemination.

Results and Discussion

Pregnancy rates at first services were 51.1% (24/47) in the control and 44.7% (21/47) in the synchronized ovulation treatment. Those for cows at repeat services, previously diagnosed open, were 60% (6/10) and 42.9 % (6/14), respectively. Overall pregnancy rates for the two treatments are illustrated in Table 1. Although the control showed a slight advantage in pregnancy rates, the difference was not significant. These results are preliminary, but suggest that it is possible to synchronize ovulation sufficiently to achieve acceptable pregnancy rates with one fixed-time insemination. This treatment may be particularly well suited to cows in which estrus is rarely observed, as well as for synchronizing first or repeat services (for cows found open at pregnancy checks). Research at other locations is finding similar successes. Other studies are ongoing in our KSU dairy herd to test further this new treatment in both heifers and lactating cows.

Table 1. Pregnancy Rates after Synchronized Ovulation at First and Repeat Services

Treatment	Pregnancy rates 28 to 35 days after AI	
	- No.-	- % -
Monday morning PGF _{2α}	30/57	52.6
Synchronized ovulation	27/61	44.3