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EARLY POSTPARTUM HORMONAL THERAPY

IMPROVES FERTILITY OF DAIRY COWS¹

J. S. Stevenson and M. BenMrad

Summary

A study of 234 Holstein cows was conducted to determine if hormonal treatments of gonadotropin-releasing hormone (GnRH or Cystorelin®) and/or prostaglandin F_{2α} (PGF or Lutalyse®) given early after calving would improve subsequent fertility of dairy cows. Treatment of cows having abnormal conditions associated with calving (puerperal problems) reduced interval from calving to conception by 43 to 48 days when GnRH was given once between days 10 and 14 postpartum or when PGF was administered once between 20 and 24 days after calving compared with cows given only saline (controls). The reduction in days open was 27 to 29 days overall for all cows (normal and abnormal) treated with either hormone compared with controls. Cows (normal and abnormal) given either hormone required 26 to 41% fewer inseminations per conception than controls. Reasons for improved fertility are discussed. We conclude that early postpartum treatments with GnRH or PGF improved fertility of dairy cows, especially those that experienced puerperal problems.

Introduction

Initiating early reestablishment of estrous cycles after calving is essential for allowing adequate time for cows to be inseminated and maintain a yearly calving interval. Normally, intervals from parturition to first ovulation average about 3 wk. Because not all first ovulations are preceded by estrus, interval to first heat averages about 5 to 6 wk. Both intervals are delayed in cows with periparturient problems such as calving problems, uterine infections, ovarian cysts, injury, or metabolic diseases (ketosis, displaced abomasum, etc.). Gonadotropin-releasing hormone (GnRH or Cystorelin®) is effective for treating ovarian follicular cysts, enhancing uterine involution, and inducing ovulation of ovarian follicles early postpartum. Another hormone, prostaglandin F_{2α} (PGF), is luteolytic or capable of regressing the corpus luteum and bringing the cow into heat in 2 to 5 days after treatment. PGF has been used effectively to treat ovarian luteal cysts and cows with pyometra or endometritis (if there was a corpus luteum present on the ovary). The objective of our study was to determine if treatments of GnRH and/or PGF could improve fertility by altering the frequency and occurrence of early postpartum estrus and ovulation.

¹We gratefully acknowledge Dr. M. D. Brown and CEVA Laboratories, Overland Park, KS for their donation of Cystorelin® and J. F. McAllister and The Upjohn Company, Kalamazoo, MI for their gift of Lutalyse® used in this study.

Procedures

This study utilized 234 Holstein cows in the KSU dairy herd, which calved between July 1, 1982 and June 30, 1983. Cows were allotted randomly at calving to one of four experimental groups (Table 1).

Table 1. Assignment of cows to treatment groups^a

Item	Group			
	1	2	3	4
Treatment	GnRH	PGF	GnRH-PGF	Saline
GnRH (200 µg)	days 10-14	-	days 10-14	-
PGF (25 mg)	-	days 20-24	days 20-24	-
No. cows	59	59	57	59

^aDays after calving when one intramuscular dose was given.

Cows were examined at calving and between 25 and 40 days postpartum for various abnormalities. Observations at both times determined whether a cow was classified as having a normal or abnormal puerperium. Abnormal classification included any cow that had dystocia, retained placenta, uterine infections, milk fever, ketosis, or unusual enlargement of the uterine horns or cervix.

Blood was collected thrice weekly to monitor blood serum concentrations of progesterone. This allowed us to know when ovulations occurred and when a corpus luteum was present. Intervals to estrus, inseminations, and conception were determined as well as average number of services per conception.

Results and Discussion

Reproductive traits were improved for cows treated with either GnRH or PGF (Table 2).

Cows given GnRH or PGF conceived earlier after calving with fewer services, and tended to have higher conception rates at first service than control cows treated with saline alone. Responses after both hormones were intermediate for the most part, except for reducing services per conception.

An additional benefit of these treatments was the positive effects on cows with an abnormal puerperium. Nearly 30% of the cows had one or more postpartum abnormalities including dystocia, retained placenta, uterine infection, purulent discharge, milk fever, ketosis, or abnormal enlargement of the uterine horns or cervix. At least 77% of the abnormalities observed were of reproductive origin. In all cases, treatment of these cows with GnRH or PGF improved subsequent reproductive performance.

Table 2. Reproductive measures of cows after treatment

Item	GnRH	PGF	GnRH-PGF	Control
First service conception, %	40	42	38	29
Normal cows	42	48	44	35
Abnormal cows	31	21	29	13
Days from calving to conception	88*	86*	96	115
Normal cows	92	83	82	97
Abnormal cows	85*	90*	109	133
Services per conception	1.7*	1.8*	2.1	2.3
Normal cows	1.7*	1.6*	1.7*	2.2
Abnormal cows	1.7*	1.9*	2.4*	2.4

*Significant improvement compared with control cows ($P < .05$).

Examining various other measurements revealed possible explanations for the improvements in fertility. GnRH treatment reduced intervals to when cows first ovulated and came into estrus after calving, as well as increasing the proportion of cows with three or more ovulations before first service from 54% for controls to 83%. Treatment with PGF reduced intervals to second and third ovulations and shortened the duration of the first estrous cycle. Both treatments increased the proportion of cows with estrous cycles of normal duration (18-24 days) before 6 wk postpartum. Therefore, improvement of fertility was associated with increased frequency and occurrence of ovulation and estrus before first services and the re-establishment of estrous cycles of normal duration. Our work suggests that all cows, especially those with an abnormal puerperium, had improved fertility when treatment early postpartum with GnRH or PGF.

At present we do not know if such treatments are repeatable in all dairy herds or if they are economical. We are conducting further studies in other herds to verify our present findings. Based on our initial work, it would appear that such treatments (GnRH on days 10, 11, 12, 13, or 14 or PGF on days 20, 21, 22, 23, or 24) are of economic value for cows that experience postpartum abnormalities because treatments result in improved reproductive performance.