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Abstract

To study the effects of gonadotropin-releasing hormone (GnRH) and timing of artificial insemination (AI) on fertility, 328 dairy cows were divided into four groups. Inseminations at first, second, or third service were done soon after detected estrus (0 hr) or 12 h later. One-half of the cows in each of the preceding groups received GnRH (100µg) or saline within 30 sec after AI. Conception at first service was not improved by GnRH. But conception rates at repeat services were improved by 21% when cows received GnRH after AI. Time of AI (0 vs 12 hr) had no effect on conception. Administering GnRH at repeat services should improve conception rate of lactating dairy cows.; Dairy Day, 1984, Kansas State University, Manhattan, KS, 1984;

Keywords

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GONADOTROPIN-RELEASING HORMONE AND CONCEPTION OF HOLSTEIN COWS[1]

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Summary

To study the effects of gonadotropin-releasing hormone (GnRH) and timing of artificial insemination (AI) on fertility, 328 dairy cows were divided into four groups. Inseminations at first, second, or third service were done soon after detected estrus (0 hr) or 12 h later. One-half of the cows in each of the preceding groups received GnRH (100 µg) or saline within 30 sec after AI. Conception at first service was not improved by GnRH. But conception rates at repeat services were improved by 21% when cows received GnRH after AI. Time of AI (0 vs 12 hr) had no effect on conception. Administering GnRH at repeat services should improve conception rate of lactating dairy cows.

Introduction

Many factors are important when attempting a successful AI program. Conception rates are influenced by correct identification of estrus, proper thawing and handling of semen, and proper timing and technique of inseminations. Few problems are more frustrating than apparently normal cows that fail to settle (repeat-breeders). Causes for repeat breeding include higher than normal fertilization failure and early embryonic death compared with normally fertile cows and heifers. There are also indications that hormone imbalance or asynchrony could be a cause for repeat breeding. Our objective was to determine whether GnRH could improve fertility of inseminations and if altering time of AI from the a.m.-p.m. rule would affect conception adversely.

Procedures

Our study involved 328 Holstein cows randomly divided into four experimental groups. Cows in Groups 1 and 2 were inseminated soon after detection of estrus (0 hr) and cows in Groups 3 and 4 were inseminated 12 hr after estrus was observed (a.m.-p.m. rule). In addition, cows in Groups 1 and 3 received 100 µg GnRH (2 cc Cystorelin®) within 30 sec after AI and cows in Groups 2 and 4 received 2 cc saline as controls. Most of the inseminations (99%) were performed by one technician during the entire study. Treatments were conducted at all first, second, and third services. First services began no sooner than 6 wk postpartum at the first detected estrus.

Results and Discussion

Results of treatment effects for conception at first services are in Table 1.

[1]We gratefully acknowledge Dr. M. D. Brown and CEVA Laboratories, Overland Park, KS, for their donation of Cystorelin® and partial financial support for this study.

Administering GnRH to cows at first service did not improve conception rates. Cows in the 0-hr group were inseminated no later than 5 hr after first observed in heat and cows in the 12-hr group were bred between 6 and 22 hr after estrus was observed. However, altering the time of AI relative to first observed estrus did not affect fertility.

Table 1. Effect of GnRH and time of AI on first service conception (%)[a]

Time of AI	Treatment at AI		Total
	Saline	GnRH	
0 hr	37/85 (43)	34/68 (50)	71/153 (46)
12 hr	46/97 (47)	35/78 (45)	81/175 (46)
Total	83/182 (46)	69/146 (47)	152/328 (46)

[a]No. cows pregnant/No. cows inseminated.

Administering GnRH at repeat services improved ($P<.07$) conception rates (Table 2). Conception after repeat services improved 10 percentage points or 21% after GnRH treatment compared with saline controls. It appeared that earlier inseminations (0 hr) followed by GnRH resulted in higher conception for repeat as well as for first services (Tables 1 and 2).

Table 2. Influence of GnRH and time of AI on conception (%) for all repeat services[a]

Time of AI	Treatment at AI		Total
	Saline	GnRH	
0 hr	38/79 (48)	36/60 (60)[b]	74/139 (53)
12 hr	37/78 (47)	48/84 (57)	85/162 (52)
Total	75/157 (48)	84/144 (58)[c]	159/301 (53)

[a]No. cows pregnant/No. cows inseminated.
[b]Saline at 0 hr vs GnRH at 0 hr ($P=.08$).
[c]Saline vs GnRH ($P=.07$).

These results demonstrate that GnRH treatment can improve conception in repeat breeding cows. The mechanism by which fertility is improved is a subject of our ongoing research. It is likely that GnRH may be stimulating release of other hormones that can improve the probability of fertilization and/or maintenance of newly forming embryos.

Recommendations

Based on this study, we recommend that GnRH be used only for repeat services. However, because of cost, use of GnRH at third services may be the most economical.