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PREGNANCY RATES OF HOLSTEIN COWS AFTER POSTINSEMINATION TREATMENT WITH PROGESTERONE

J. S. Stevenson and M. O. Mee

Summary

The objective of this experiment was to determine if pregnancy rates following first services would be improved by supplementing lactating dairy cows with progesterone during two phases after insemination. Cows were inseminated at estrus (day 0), and progesterone was administered via a progesterone-releasing intravaginal device (PRID) from days 5 to 13 or days 13 to 21 after first service with untreated cows serving as controls. Pregnancy rates at first services were unaffected by the progesterone treatments whether the cows received a PRID from days 5 to 13 (13/36 or 36%), a PRID from days 13 to 21 (18/36 or 50%), or no PRID (39/92 or 42%). Fewer nonpregnant cows receiving the PRID returned to estrus 17 to 27 days after the first service compared to the controls (27 vs. 49%). However, this apparently was not associated with improved embryonic survival in the cows receiving progesterone because the pattern of cows returning to estrus after first service was similar, except for 17 to 27-day period cited above. Supplementing progesterone to lactating dairy cows after first services did not seem to improve fertility.

(Key Words: Pregnancy Rates, Cows, Progesterone.)

Introduction

The presence of the corpus luteum (CL) and its progesterone-secreting capacity is essential to maintain pregnancy in the cow. Pregnancy elevates concentrations of progesterone in the blood stream as early as day 6 after estrus (day 0) and ensures that the uterus is noncontractile during development of the embryo and fetus. Attempts to improve pregnancy rates by stimulating the CL to secrete more progesterone using various gonadotropin substances have produced some

positive and negative results. In addition, providing supplemental progestogen at various doses and methods of administration after insemination either increased or had no effect on pregnancy rates.

Our objective was to determine if supplementing progesterone during two phases after first postpartum services using an intravaginal device known as the PRID would improve the fertility of lactating dairy cows. We chose to supplement progesterone during a period of increasing titers of progesterone in the blood and rapid CL growth (days 5 to 13) and during a period of maximal progesterone secretion (days 13 to 21) once the CL has reached its near maximal diameter.

Procedures

Lactating Holstein cows (n=179) utilized in this study calved between July, 1989 and June, 1990. Three groups of cows were formed after first services were given. Two groups received exogenous progesterone via an experimental progesterone-releasing intravaginal device (PRID), authorized by the U.S. Food and Drug Administration as Investigational New Animal Drug Application #6450. The PRID is a silastic elastomer coil (2 × 10 in) that is impregnated with 1.5 g crystalline progesterone. It is inserted into the vagina and rests against the cervix, making contact with the dorsal, lateral, and ventral portions of the vagina, allowing the progesterone to be absorbed into the vaginal wall. The three groups of cows received after first service (ranging from 42 to 85 days postpartum): 1) a PRID from days 5 to 13 (PRID-5; n=44); 2) a PRID from days 13 to 21 (PRID-13; n=43); or 3) no PRID (controls; n=92). Blood samples were collected from some of the cows in each treatment group on days 5, 13, and 21 after estrus and insemination (i.e., at the time the PRID treatments

were inserted or removed). Pregnancy rates were determined by palpation of the uterus and its contents at 42 to 56 days after insemination.

Results and Discussion

Retention of the PRIDs was 83%. Eight PRIDs were not retained for the full 8-day period in the PRID-5 group and seven PRIDs were lost in the PRID-13 group, leaving 36 cows in each PRID group for comparison of pregnancy rates with the control cows. Pregnancy rates of the three experimental groups are shown in Table 1. Pregnancy rates appeared to be slightly less in the PRID-5 and control cows compared to the PRID-13 group. Two other studies reported a tendency for increased pregnancy rates (PRID inserted from days 13 to 21 after first service) or a significant increase in pregnancy rates when a PRID was inserted from days 5 to 12 or from days 12 to 17 after first services during both summer and winter.

Table 1. Pregnancy Rates after First Service and Supplemental Progesterone Treatment

Treatment group	Pregnancy rate
Control	39/92 (42%)
PRID-5	13/36 (36%)
PRID-13	18/36 (50%)

Concentrations of progesterone in serum of nonpregnant cows are illustrated in Figure 1. Progesterone was similar in all three groups of cows on days 5 and 13 after estrus and insemination but was elevated ($P < .05$) in PRID-13 cows on day 21 compared to the PRID-5 and control cows. Concentrations of progesterone in the PRID-13 cows were due to the treatment effect of the PRID, which was removed after the day-21 blood sample was collected.

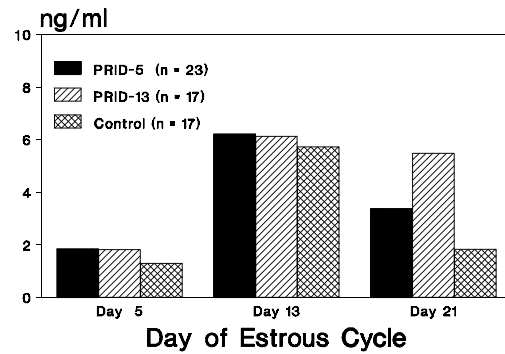


Figure 1. Concentrations of Progesterone in Serum of Nonpregnant Cows on Days 5, 13, and 21 after Estrus (Day 0) and First Service.

Concentrations of progesterone in serum of pregnant cows were similar in all groups on days 5 and 13 but were higher ($P < .05$) in the PRID-13 cows than the PRID-5 cows on day 21 of pregnancy (Figure 2).

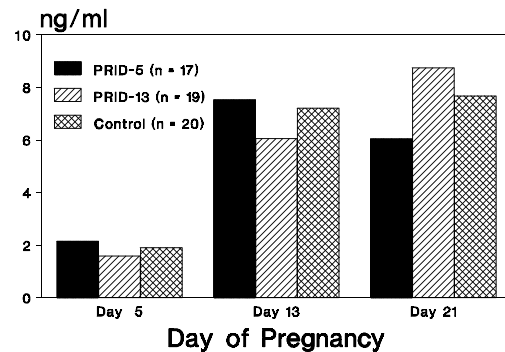


Figure 2. Concentrations of Progesterone in Serum of Pregnant Cows on Days 5, 13, and 21 after Estrus (Day 0) and First Service.

The percentage of nonpregnant cows returning to estrus 17 to 27 days after first service was reduced ($P < .05$) to 27% in the combined PRID groups compared to 49% of the control cows. Percentages of cows returning to estrus were similar at days 25 to 38, days 39 to 47, days 48 to 59, and days 60 to 70 after first service, indicating that embryonic survival was unaffected by the treatments. Although we successfully elevated progesterone in these cows via the PRID, pregnancy rates were unaltered.