

Sexual Behaviors, Estrus Detection and Conception of Heifers Synchronized by Progesterone Intravaginal Device (Prid) and Synchronate-B

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Summary

Seventy four Holstein heifers were randomly assigned over three trials to PRID-7 + PG-6 and Synchronate-B-9 regimens to synchronize estrus cycle for embryo transfer. Sexual behaviors; mounting, standing, orientation, chin-resting, sniffing, licking, rubbing and butting, vaginal swelling and mucus discharge were observed between 06-08, 12-14 and 18-20 h on 1st day and 00-02, 06-08, 12-14 and 18-20 h on 2nd day after removal of hormones.

Synchronate-B treatment (81.6%) showed higher synchronized estrus rate than PRID treatment (77.8%) during observation period. Standing estrus was observed within 74 h after PG injection in PRID and within 52 h after removal of implant in Synchronate-B. About 68% of heifers in PRID and 74% of heifers in Synchronate-B showed standing estrus between 0-14 h on 2nd day after removal of the hormones. Synchronate-B resulted in a tighter synchrony of standing estrus than PRID. Incidence of average mounting and standing per head during observation period was 22.3 and 16.6 in PRID and 28.1 and 13.6 in Synchronate-B. The PRID showed peak in active mounting at 18-20 h on 1st day, however, the Synchronate-B showed at 0-2 h on 2nd day after removal of hormone. Active standing was shown between 18 h on 1st day to 20 h on 2nd day in PRID, however, between 0 - 14 h on 2nd day after removal of hormone in Synchronate-B. There was slight difference in pattern of active mounting and standing during estrus between PRID and Synchronate-B.

Conception rate of synchronized heifers transferred with fresh and frozen embryos by non-surgical and surgical methods was higher in Synchronate-B (62.5%) than in PRID (38.5%). Chin-resting showed highest incidence among 6 sexual behavioral components in the both treatments. Synchronate-B showed higher incidence of chin-resting (16.6) than PRID (10.7). Synchronate-B group showed also higher incidence of orientation, sniffing and butting than PRID group. Synchronate-B resulted in more active sexual behaviors than PRID. The pattern of incidence of chin-resting, licking and butting was almost symmetrical in PRID with their peak values at 6-8 h on 2nd day, however in Synchronate-B chin-resting and sniffing was symmetrical with their peak values at 12-14 h on 2nd day after removal of hormone.

There was a tendency to increase vaginal swelling according to time passage of synchronized estrus in the both treatments. Incidence of mucus discharge in Synchronate-B was slightly higher than in PRID. Twenty to 40% was false negative in conception rate by tail painting before re-estrus day as judged by rectal palpation.

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Introduction

Accurate estrus detection is the key to efficient reproduction and high milk production (Foote, 1975). For estrus cycle regulation prostaglandin $F_{2\alpha}$ (PG) or its analogue has been administered twice at an interval of 10 to 12 days (Graves et al., 1974; Cooper and Rowson, 1975; Lauderdale, 1975). However, the results of some trials (Roche, 1977; Roche et al., 1981) suggested that acceptable pregnancy rates were not always obtained using these methods.

One approach has been to combine PG treatment with progesterone administration (Wishart, 1974; Delatang, 1975; Thimonier et al., 1975; Heershe et al., 1979). A method combining 7-d PRID treatment with PG administration at 24 h before PRID removal resulted in excellent synchrony of estrus and high fertility (Hansel and Beal, 1979; Smith et al., 1984). Another method using implant of 6 mg Norgestomet and injectin of 5 mg estradiol valerate and 3 mg Norgestomet attained a higher degree of control of estrus (Wiltbank et al., 1975; Miksch et al., 1978; Spintzer et al., 1978).

Experiment was conducted to study sexual behaviors, estrus detection and conception rate in Holstein heifers synchronized estrus using PRID with a single dose of PG and Synchronate-B.

Materials and Methods

Seventy-four Holstein heifers from the Cornell University herd were assigned randomly to PRID and Synchronate-B groups during three trials conducted over 6 months period in a free stall barn. All heifers were sexually matured with normal reproductive organs, indications of cyclic activity and 340 kg in weight. PRID containing 1.5g of progesterone is installed in the vagina for 7 days. On sixth day of installation, the animal is given 25 mg of PGF $_{2\alpha}$. This is called as PRID-7 + PG-6. Synchronate-B containing 6 mg of progesterone is implanted in the ear and at this time the animal is given intramuscularly 3 mg of estradiol valerate and 2 mg of the progesterone. The implant is removed 9 days later. This is called as Synchronate-B-9. Synchronate-B implant was 2 days earlier than PRID

installation. PRID and Synchronate-B were installed at 8 am and removed at 6 am and 4 pm respectively.

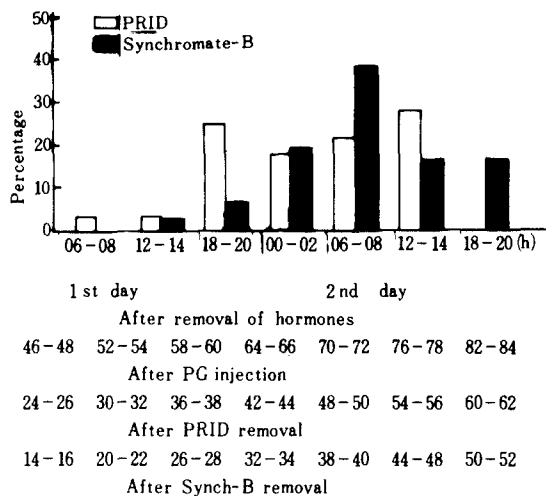


Fig. 1. Percentage of heifers in standing estrus during observation period

Sexual behaviors; mounting, standing, orientation, chin-resting, sniffing, licking, rubbing and butting, vaginal swelling and mucus discharge were observed between 06-08, 12-14 and 18-20 h on 1st day and 00-02, 06-08, 12-14 and 18-20 h on 2nd day after removal (0 day) of PRID and Synchronate-B. The time of standing estrus was set where the animal showed highest incidence of standing. In trial 1, 9 heifers were non-surgically transferred with fresh embryos and 12 heifers were surgically transferred with frozen embryos on day 7 of estrus. In trial 2, eight heifers were non-surgically transferred with fresh embryos on day 7 of estrus.

In trial 1 and 2, for the prediction of early fecundity re-estrus of the animal was checked on day 19 to 23 of estrus by method of painting on tail. Pregnancy status was determined by rectal palpation at 50 days after transfer.

Results and Discussion

Percentage of cow in standing estrus, incidence of mounting and standing per head during observation period, estrus synchronized percentage, and conception rate in PRID-7 + PG-6 and Synchronate-B-9 groups

were shown in Table 1. Synchronate-B-9 treatment (81.6%) showed higher synchronized estrus rate than PRID-7 + PG-6 (77.8%) during observation period within 2 days after removal of PRID and Synchronate-B. About 78% of the heifers treated in PRID-7 + PG-6 were observed in standing estrus within 74 h after PG injection and 82% of the heifers treated in Synchronate-B-9 were observed in standing estrus within

52 h after removal of Synchronate-B. Smith et al. (1984) reported that 73% of the PRID-7 + PG-6 treated heifers were observed in estrus between 64 and 88 h after PG injection. Hoagland et al. (1984) reported that 19 of 20 postpartum beef cows came into an estrus within 5 days of Synchronate-B removal. Anderson et al. (1982) also reported that 88.3% of heifers treated with Synchronate-B only were in estrus within 5 days

Table 1. Estrus Synchronization of Holstein heifers by progesterone intravaginal device (PRID) and Synchronate-B

Day after removal (O) of hormone	1 st				2 nd				Total
	06-08	12-14	18-20	00-02	06-08	12-14	18-20		
Observation time (h)									
No. of heifers in standing estrus (%)	1	1	7	5	6	8	0	28	
No. of average mounting per head	3.6	3.6	25.0	17.9	21.4	28.6	0		
PRID No. of average standing per head	5.8	7.4	8.4	7.1	6.3	6.5	3.2	22.3 ^a	
No. of heifers treated	1.3	2.4	8.6	6.2	4.7	4.4	3.3	16.6 ^b	
No. of heifers synchronized	No. of heifers synchronized		No. of non-estrus heifers		No. of conception by E. T.				
36	28 (77.8)		8 (22.2)		5/13 (38.5)				
Synch-B No. of heifers in standing estrus (%)	0	1	2	6	12	5	5	31	
No. of average mounting per head	0.0	3.2	6.4	19.4	38.7	16.1	16.1		
No. of average mounting per head	3.8	5.2	7.2	10.1	8.2	7.8	3.8	28.1 ^a	
Synch-B No. of average standing per head stand-	0.5	1.6	2.2	5.0	4.7	4.2	2.2	13.6 ^b	
No. of heifers treated	No. of heifers Synchronized		No. of non-estrus heifers		No. of conception by E. T.				
38	31 (81.6)		7 (18.4)		10/16 (62.5)				

a : No. of average mounting during observation period per head

b : No. of average standing during observation period per head

() : %

of implant removal. Spitzer et al. (1978) reported that the proportion of treated heifers in estrus by 120 h after Norgestomet removal was 85-100% through trials. As shown in Fig. 1, 67.9% of heifers in PRID-7 + PG-6 and 74.2% of heifers in Synchronate-B-9 showed standing estrus between 00-14h on 2nd day after removal of the hormones. These analyses, therefore, suggest that

Synchronate-B-9 resulted in a tighter synchrony of standing estrus than PRID-7 + PG-6 treatment.

Incidence of average mounting per head during observation period was 22.3 in PRID and 28.1 in Synchronate-B (Table 1). Synchronate-B group showed slightly higher incidence of mounting per head than PRID group. The PRID showed peak in mounting

incidence at 18-20 h on 1st day after removal of PRID, however the Synchronate-B showed peak at 00-02 h on 2nd day after removal of implant (Fig. 2). The PRID group showed active mounting between 12:00 h on 1st day to 02 h on 2nd day after removal of hormone, however Synchronate-B group showed active mounting between 18:00 h on 1st day to 14:00 h on 2nd day after removal of implant. De Silva et al. (1981) reported that mean estrus activity declined from 9.4 mounts per h at 0 h (at the initial observation of estrus) to 1.6 mounts per h at 12 h. These results suggest that pattern of mounting behavior is slightly different between PRID and Synchronate-B treatments.

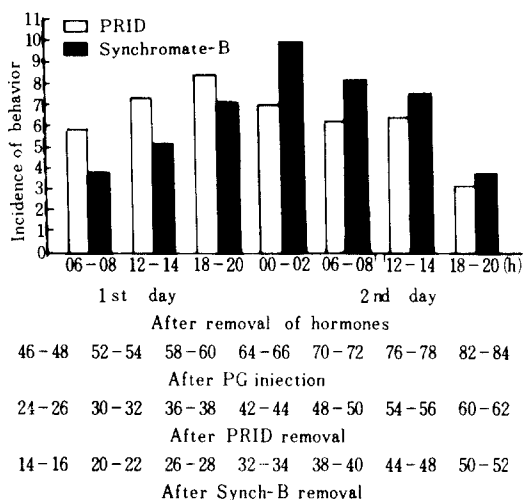


Fig. 2. Average mounting per head during observation period

Incidence of average standing per head during observation period was 16.6 in PRID and 13.6 in Synchronate-B (Table 1). PRID group showed slightly higher incidence of standing than Synchronate-B group. Active standing was shown between 18:00 h on 1st day to 20:00 h on 2nd day after removal of hormone in PRID treatment, however it was shown between 0:00 h to 14:00 h on 2nd day after removal of implant in Synchronate-B group. Also there was slight difference in pattern of standing during estrus period between PRID and Synchronate-B treatments. Williamson et al. (1972) suggested that standing could be used to detect estrus. Active standin on 1st and 2nd day after removal

of hormones in PRID and Synchronate-B treatments could be used as a good tool to detect synchronized estrus. Hurnick et al. (1975) indicated that on the average, more standing cows (90%) were in estrus than mounting one (79%).

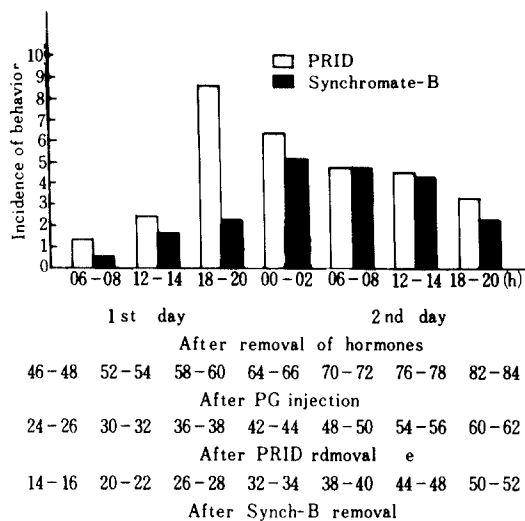


Fig. 3. Average standing per head during observation period

Conception rate of synchronized heifers transferred with fresh and frozen embryos by non-surgical and surgical methods is higher in Synchronate-B (62.5) than in PRID (38.5%) (Table 1). Smith et al. (1984) reported pregnancy rate in PRID-7 + PG-6 treated heifers (66%) did not differ from that in untreated control (73.3%). Anderson et al. (1982) reported that first service conception rate of heifers in Synchronate-B-9 treatment was 72.7%. When a total of 71 synchronized heifers with Cloprostenol were transferred with frozen embryos, a total of 32 recipients (45.1%) maintained pregnancy (Nieman et al. 1985). Pregnancy rate of dairy and beef heifers synchronized in Synchronate-B-9 treatment was 60.9-65.7% (Mulvehill et al. 1978, Wishart et al. 1977a, Wishart et al. 1977b). Pregnancy rate of dairy heifers synchronized in PRID treatments was 55.7-66.7% (Mauer et al. 1975, Roche 1976a). Comparatively higher conception rate (62.5%) in Synchronate-B than in PRID (38.5%) in this trial suggests that estrus control regimen by Synchronate-B

mate-B-9 is more effective than by PRID-7 + PG-6 regimen.

Incidence of differential sexual behaviors; orientation, chin-resting, sniffing, licking, rubbing and butting, vaginal swelling and mucus discharge of heifers in PRID and Synchronate-B treatments during observation period are shown in Table 2 and Fig. 4. Chin-resting showed highest incidence among six sexual behavioral components in the both treatments (Fig. 4). Synchronate-B group showed higher incidence of chin-resting (16.6) than PRID group (10.7). Synchronate-B group showed also higher incidence of orientation, sniffing and butting than PRID group. These results suggest that Synchronate-B group shows more active sexual behaviors than PRID group during synchronized estrus. Duration of active incidence of chinresting was between 12:00 h on 1st day to 08:00 h

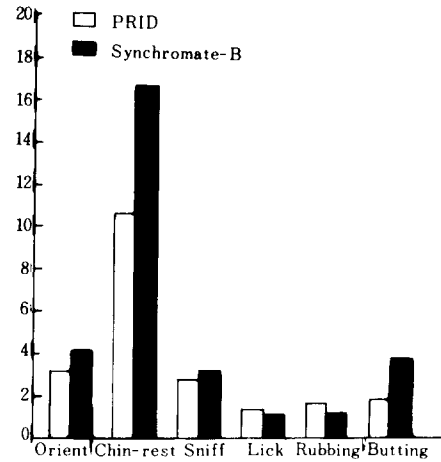


Fig. 4. Incidence of sexual behaviors per head during observation period of synchronized estrus heifers

Table 2. Differential sexual behaviors between PRID and Synchronate-B groups in Synchronized estrus

Behaviors Obs. time	Orient.	Chin.	Sniff	Lick	Rubb.	Butt.	Vaginal swell.				Mucus				
							-	S	M	L	-	S	M	L	
PRID (24)															
1 st	06-08	1	1	5	0	3	2	12	9	1	2	24	0	0	0
	12-14	17	45	18	4	10	12	-	-	-	-	20	4	0	0
	18-20	11	53	18	7	6	19	8	12	2	2	22	2	0	0
2 nd day	00-02	9	46	3	3	5	15	3	11	7	3	21	1	1	1
	06-08	10	69	12	12	6	28	5	8	8	3	22	2	0	0
	12-14	16	25	8	3	2	13	6	8	6	4	22	2	0	0
	18-20	12	18	3	2	9	3	-	-	-	-	22	1	0	1
Total	376	257	67	31	41	46									
Mean	3.2	10.7	2.8	1.3	1.7	1.9									
Synchronate-B (25)															
1 st	06-08	0	1	3	0	0	2	7	10	7	1	24	1	0	0
	12-14	3	13	5	0	1	8	-	-	-	-	23	2	0	0
	18-20	15	64	5	0	0	12	5	8	8	4	18	3	2	2
2 nd day	00-02	22	90	5	3	0	22	0	9	9	7	19	4	1	1
	06-08	21	89	10	8	5	17	4	5	11	5	20	2	0	3
	12-14	16	109	31	7	6	12	2	9	10	4	16	4	2	3
	19-20	18	50	21	11	17	22	-	-	-	-	23	2	0	0
Total	105	416	80	29	29	95									
Mean	4.2	16.6	3.2	1.2	1.2	3.8									

() : No. of heifers

on 2nd day in PRID and between 18:00 h on 1st day to 14:00 h on 2nd day in Synchronate-B (Table 2). PRID group showed earlier beginning and ending of active incidence of chin-resting than Synchronate-B group. Mounting, standing, chin-resting and another sexual behaviors in this trial are associated with the effective detection of the end as well as the beginning of estrus in synchronized heifers by PRID and Synchronate-B. The pattern of incidence of chin-resting, licking and butting was almost symmetrical in PRID group with their peak values at 6:00-8:00 h on 2nd day, however, in Synchronate-B group incidence of orientation, chin-resting and sniffing was symmetrical with their peak values at 12:00-14:00 h on 2nd day after removal of hormone.

There was a tendency to increase vaginal swelling according to time passage of synchronized estrus in the

both groups. Mucus discharge was shown in estrus synchronized heifers with PRID and Synchronate-B, and incidence of mucus discharge in Synchronate-B was slightly higher than in PRID treatment (Table 2).

Pregnancy of estrus synchronized recipients to which fresh and frozen embryos were transferred was checked by rectal palpation and tail painting methods. Accuracy of pregnant rate by tail painting method was 80% in PRID and 60% in Synchronate-B groups (Table 3). In an early test with KaMaR Heatmount Detector, Baker (1965) found 4 of the 72 heifers (6%) were false positive as judged by rectal palpation. The difference between rectal palpation and tail painting in pregnancy was 20-40%, however, tail painting before re-estrus day will give aid for early routine detection of pregnancy.

Table 3. Comparison of pregnancy rate of heifers with rectal palpation and tail painting methods

	PRID	Synchronate-B	Total
No. of heifers transferred	13	16	29
No. of pregnant heifers by rectal palpation	5	10	15
No. of positive pregnancy by tail painting	4	6	10
No. of negative pregnancy by tail painting	1	4	5

No. of pregnant heifers by tail painting	5	9	14
No. of positive pregnancy by rectal palpation	4	6	10
No. of negative pregnancy by rectal palpation	1	3	4

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