EFFICACY OF A PROSTAGLANDIN F2α ANALOGUE OR PRID FOR SYNCHRONIZATION OF OESTRUS IN DAIRY COWS.

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SUMMARY

A herd of 247 lactating dairy cows was divided into three groups. Group 1 served as controls and were inseminated at observed oestrus. Group 2 received two injections of fenprostalene (Synchrocept B, Syntex) 12 days apart. Group 3 had PRIDs inserted for nine days and received an injection of fenprostalene one day before PRID removal. Insemination for Groups 2 and 3 was at 80 and 63 hours respectively after treatment finished and again at an observed oestrus during the subsequent 25 days. For Groups 2 and 3, 34% and 67% of cows were in oestrus by the time of their respective fixed-time insemination. Conception rates to that insemination were 22% and 31% for Groups 2 and 3 respectively. Insemination at observed oestrus over the following week increased conception rate for Groups 2 and 3 to 34% and 52% respectively. Conception rates after 25 days were 67 and 68% compared to 69% for controls. In five other cows injected with fenprostalene at mid-cycle plasma progesterone did not decline, indicating poor luteolysis after treatment.

INTRODUCTION

Attempts to develop a successful method for synchronization of oestrus in the cow have focused on the use of analogues of prostaglandin F2α (PG). This agent is luteolytic in the cow (Rowson et al. 1972). Following administration there is a fall in plasma progesterone concentration (Lemon et al. 1975) after which treated cows come into synchronized oestrus and ovulate (Roche 1976). However, the interval to onset of oestrus has been highly variable and conception rates have been low under field conditions (MacMillan and Curnow 1976).

An alternative method for synchronization of oestrus uses a solid phase system for delivery of progesterone and takes the form of the Progesterone Releasing Intravaginal Device (PRID). The PRID has a capsule attached which contains oestradiol benzoate (ODB). This combination has been shown to result in normal conception rates to AI in synchronized cows (Roche 1976). Since the administration of oestrogens to livestock has been prohibited in Victoria, a method was developed which allowed the use of the PRID without ODB and which gave acceptable synchronization and conception rates to AI (Folman et al. 1983; McPhee et al. 1983). The method involves the insertion of a PRID for nine days with an injection of PG one day before PRID removal. The PG used was cloprostenol (Estrumate, ICI). Another analogue, fenprostalene (Synchrocept B, Syntex) has been released recently. This paper reports a comparison between two methods of synchronization of oestrus; either, two injections of PG or PRID treatment with an injection of PG one day before PRID removal. The PG analogue used in this study was fenprostalene.

MATERIALS AND METHODS

Experiment 1. Preliminary study

Thirty, non-lactating dairy cows had PRIDs inserted for nine days and were given an injection of 1 mg of fenprostalene (Batch No. V926) one day before PRID removal.
removal. Following PRID removal, observations to detect oestrus were made during half-hour periods every four hours.

**Experiment 2. Field studies**

This experiment was conducted on a commercial dairy farm in October, 1982. Two hundred and forty seven lactating dairy cows were allotted to three groups after taking account of age, post partum interval and breed. At the time of the fixed-time AI the cows were 66.1 ± 12.9 days (mean ± SD) after parturition. The treatments were as follows: Group 1 (Controls), cows were inseminated at observed oestrus over a 25 day period. Group 2 (2PG), cows received two injections each of 1mg of fenprostalene (Batch No. 7953) 12 days apart. Group 3 (PRID 9) cows had a PRID inserted for nine days and received one injection of fenprostalene (1mg, Batch No. 7953) one day before PRID removal.

Observations to detect oestrus were commenced at the end of treatment and were carried out at milking and at 1200 and 2000h each day for seven days. Cows of Group 2 (2PG) were inseminated 80 hours after the second PG injection. Cows of Group 3 (PRID 9) were inseminated 63 hours after PRID removal. All animals were inseminated with frozen semen (20 x 106 sperm per straw). Cows which showed oestrus after the fixed-time insemination were re-inseminated at observed oestrus over the next 25 days. Pregnancy diagnosis was carried out by rectal palpation 60 days after the fixed-time insemination.

**Experiment 3. Oestrous response to one PG injection**

In January 1983, nine cows known from observation to be at day 10 to 12 of their oestrous cycle were selected. Five cows were given an injection of fenprostalene (1mg, Batch No. 7953) and the remaining four cows were given an injection of 0.5mg of cloprostenol. The cows were then observed twice daily for half-hour periods for a week. Commencing two hours before the PG injections, blood samples for plasma progesterone assay were collected at two-hourly intervals for 16 hours and then daily for eight days after the injections. These samples were assayed by the method of Hossian et al. (1979).

**Statistical analysis**

Data for mean interval to onset of oestrus were examined by analysis of variance. Data for cows showing oestrus by time of insemination and for conception were analysed by Chi-square. Cows which were diagnosed as 60 days pregnant and had shown oestrus by the fixed-time AI were regarded as conceiving to that AI. Cows which were diagnosed 60 days pregnant but which showed oestrus during the six days after fixed-time AI were regarded as having conceived to re-insemination at oestrus.

**RESULTS**

In Experiment 1, the mean (±SD) interval from PRID removal to onset of oestrus was 44.6 ± 7.6 hours and 77% of cows had shown oestrus by 60 hours after PRID removal.

In Experiment 2, two COWS lost PRIDs and data from these animals were excluded from analysis. The data for incidence of oestrus, interval to oestrus and conception rate are shown in Table 1. The proportion of cows showing oestrus after treatment was significantly greater in the PRID 9 group than the 2PG group, however there was no difference in conception rate to the fixed-time AI or to re-insemination over 25 days.
TABLE 1  Onset of oestrus after treatment and conception rate to A.I. of cows

<table>
<thead>
<tr>
<th>Item</th>
<th>Control</th>
<th>2PG</th>
<th>PRID 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number in group</td>
<td>82</td>
<td>83</td>
<td>81</td>
</tr>
<tr>
<td>Oestrus by fixed-time AI (%)</td>
<td>N.A.</td>
<td>33.7</td>
<td>66.6*</td>
</tr>
<tr>
<td>Oestrus by 6 days (%)</td>
<td>28.3</td>
<td>55.4</td>
<td>97.5*</td>
</tr>
<tr>
<td>Mean interval to oestrus (h SD)</td>
<td>N.A.</td>
<td>183.5 ± 131.4</td>
<td>74.5 ± 50.3*</td>
</tr>
<tr>
<td>Conceiving to fixed-time Al (%)</td>
<td>N.A.</td>
<td>21.6</td>
<td>30.9</td>
</tr>
<tr>
<td>Conceiving to Al within 6 days (%)</td>
<td>14.8</td>
<td>33.7</td>
<td>51.8*</td>
</tr>
<tr>
<td>Conception rate after 25 days (%)</td>
<td>65.1</td>
<td>67.4</td>
<td>67.9</td>
</tr>
</tbody>
</table>

+ Significantly different from other treatments, P < 0.05

In Experiment 3, the interval to oestrus in the five cows given a single injection of fenprostalene (225.6 ± 125.4 h mean ± SD) was significantly (P < 0.01) longer than the interval to oestrus in the four cows given a single injection of cloprostenol (82.0 ± 17.3 h). Figure 1 shows plasma progesterone profiles in cows receiving either fenprostalene or cloprostenol. It was clear that fenprostalene did not cause a rapid decline in plasma progesterone whereas cloprostenol did so.

Fig. 1  Plasma progesterone concentration (ng/ml) in cows after a single injection of cloprostenol or fenprostalene
DISCUSSION

The mean interval to onset of oestrus after PRID removal of cows in Experiment 1 was 30 hours shorter than for the same treatment as PRID 9 in Experiment 2, although the proportion of cows in oestrus by 63 hours after PRID removal was similar in the two experiments and to the results of Folman et al. (1983). The proportion of cows in the 2PG group in oestrus at the fixed-time AI, 80 hours after the second PG was much lower than expected. Apart from the initial responders the remaining cows came into oestrus at a rate similar to untreated cows.

Conception rates to fixed-time AI and re-insemination over the next six days in the PRID 9 group were lower than expected from published work (Folman et al. 1983) even though 97% of animals had shown oestrus and been inseminated. In the 2PG group the low conception rate to the fixed-time AI probably reflected the poor synchronization. By the end of the 25 day period the conception rate for the three groups were similar although a more concentrated calving could be expected in half the PRID 9 group.

When given as a single injection to five cows at mid-cycle, fenprostalene did not synchronize oestrus as shown by the mean interval to oestrus and continuation of luteal concentrations of progesterone. Since different batches of fenprostalene were used it is possible that batch to batch variability in potency could account for the failure of fenprostalene to give satisfactory synchronization in the second and third studies. Alternatively the highly viscous nature of fenprostalene may limit the effective release rate from depot injection. These possibilities remain to be investigated.

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REFERENCES


