

SYNCHRONISATION OF OESTRUS IN DAIRY COWS USING PROGESTERONE  
ADMINISTERED BY "CONTROLLED INTERNAL DRUG RELEASE" (CIDR) DEVICES

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SUMMARY

The efficacy of CIDR devices (AHI, NZ) used either alone or combined with prostaglandins to synchronise oestrus was evaluated in a herd of lactating dairy cows. Onset of oestrus and fertility to artificial insemination (A.I.) at observed oestrus or to A.I. at a fixed time were measured, and the following treatments were compared:

- Group 1, untreated cows that were inseminated at observed oestrus.
- Group 2, a CIDR was inserted for 12 days followed by A.I. at observed oestrus after CIDR removal.
- Group 3, a CIDR was inserted for 7 days with a luteolytic dose of prostaglandin F2 $\alpha$  analogue administered on day 6. All animals were inseminated at 63h after CIDR removal followed by A.I. at observed oestrus.

The proportions of cows showing oestrus during the first 5 days were 22%, 78% and 87%, and by 25 days were 85%, 92% and 98% for groups 1, 2 and 3 respectively. In group 3, 83% of animals had exhibited oestrus and 49% subsequently conceived to A.I. at the fixed time of 63h. Pregnancy rates after 25 days of mating as determined by rectal palpation were 46%, 62% and 64% for groups 1, 2 and 3 respectively. These results demonstrate that the CIDR is an effective device for synchronisation of oestrus in dairy cows, and when used in combination with luteolytic prostaglandins this synchronisation is sufficiently precise for successful A.I. at a fixed time. Key words: Dairy cattle, Reproduction, Oestrus synchronisation.

INTRODUCTION

Oestrus and ovulation in heifers and parous cows can be synchronised effectively by a hormonal treatment regime involving short term progestagen treatment combined with administration of prostaglandin (PG) F2 $\alpha$  analogues. Comparisons of the effectiveness of various treatment regimes has shown that a 7 day continuous progestagen treatment with a single dose of PG on day 6 is optimal in terms of degree of synchronisation and fertility (Heershe et al. 1978; Hansel and Beal 1979; Roche 1975; Thimonier 1975; Smith et al. 1984). The progestational agents have been delivered in the form of norgestomet ear implants (Intervet Aust.) or Progesterone Releasing Intravaginal Devices, (PRID, CEVA Australia). A new progesterone delivery device, the CIDR, has been developed in New Zealand by Dr. R.A. Welch in association with Mr. D. Millar of Alex Harvey Industries, Plastic Moulding Company Ltd. The CIDR is an intravaginal device moulded from plastic and coated with a silastic polymer impregnated with progesterone. This experiment was designed to assess the efficacy of the CIDR device used either alone or in combination with a PG to synchronise oestrus in lactating dairy cows.

## MATERIALS AND METHODS

One hundred and eighty four lactating dairy cows were allocated into 3 groups following random stratification on the basis of post partum interval ( $66.5 \pm 2.2$ , days  $\pm$  SE), age (two to nine years) and breed (Friesian, Friesian Jersey cross).

Group 1 (Control,  $n=65$ ), was inseminated within 24h of observed oestrus.

Group 2 (CIDR12,  $n=57$ ), had CIDR devices inserted for 12 days and cows were then inseminated at observed oestrus after CIDR removal.

Group 3 (CIDR7 PG6,  $n=62$ ), had CIDR devices inserted for seven days and received 0.5mg i.m. of PG (Estrumate, ICI) on day 6. All animals in group 3 received an insemination at a fixed time of 63h after CIDR removal. During the following five days those cows identified in oestrus more than 12h after A.I. at a fixed time were re-inseminated. Cows which did not conceive to the fixed time or subsequent insemination were inseminated again at observed oestrus in the next cycle.

The CIDR devices were inserted into the anterior vagina without reference to the stage of the oestrous cycle. All animals were grazed together and observed for standing oestrus at 3h intervals during daylight hours for five days after CIDR removal. Tail paint was applied to all animals to assist oestrus detection. Pregnancy tests were carried out by rectal palpation and ultrasonic real time scanning at 90 days after CIDR removal.

Data for mean interval from CIDR removal to onset of oestrus and conception was examined by least squares analysis of variance. The proportions of animals which had conceived at various times after start of mating were compared by chi-square analysis.

## RESULTS

In groups 2 and 3 respectively 12% (7/57) and 15% (9/62) of cows expelled their CIDR and these animals were excluded from analysis. Of the remaining animals, synchronisation using the CIDR alone or combined with PG gave effective synchronisation and acceptable conception rates (Table 1). More animals showed oestrus during the first five days of mating ( $P<0.05$ ) and the mean interval to first oestrus was less for the synchronised groups than in the unsynchronised controls ( $P<0.05$ ). By day 25 there was no difference between groups in the proportion of animals exhibiting first oestrus. The proportion of animals conceiving by day 5 was also greater ( $P<0.05$ ) for both synchronised groups than for controls but by day 25 this advantage was only evident in the CIDR7 PG6 synchronised group. The earlier onset of oestrus in the CIDR7 PG6 group also resulted in an earlier conception date than for the naturally cycling controls ( $P<0.05$ ). By day 42 of mating the proportion conceived in all groups was not different.

Treatments were not detrimental to fertility since conception rates to first A.I. in the CIDR12 (46%) and CIDR7 PG6 (50%) groups were not different from conception rates in controls (49%).

For the animals synchronised with the CIDR7 PG6 regime, 83% (44/53) exhibited oestrus between 19 to 75h after CIDR removal with a mean onset of oestrus of  $47.3 \pm 2.0$ h (mean  $\pm$  s.e.) and 49% (26/53) of these animals conceived to the A.I. at a fixed time of 63h.

Table 1 Patterns of oestrus after CIDR removal and subsequent pregnancy rates following artificial insemination

Item		Treatment Group		
		Control 1	CIDR12 2	CIDR7 PG6 3
Number in group		65	50*	53*
Number (%) exhibiting first oestrus by:	day 5	14 <sup>a</sup> (22)	39 <sup>b</sup> (78)	46 <sup>b</sup> (87)
	day 25	55 (85)	46 (92)	52 (98)
Number (%) conceived by:	day 5	5 <sup>a</sup> (7)	18 <sup>b</sup> (36)	26 <sup>b</sup> (49)
	day 25	30 <sup>a</sup> (46)	26 <sup>ab</sup> (62)	34 <sup>b</sup> (64)
	day 42	40 (62)	34 (68)	38 (72)
Number (%) not pregnant:		15 (23)	12 (24)	13 (25)
Mean interval to first oestrus (days $\pm$ s.e.)		15 $\pm$ 1 <sup>a</sup>	5 $\pm$ 1 <sup>b</sup>	5 $\pm$ 1 <sup>b</sup>
Mean interval to conception (days $\pm$ s.e.)		24 $\pm$ 2 <sup>a</sup>	18 $\pm$ 3 <sup>a</sup>	13 $\pm$ 2 <sup>b</sup>
Insemination/Conception by day 42:		2.1	2.1	2.3

a,b, data with different superscripts differ significantly ( $P < 0.05$ ).

\* Those animals which lost CIDRS have been excluded from Table 1.

#### DISCUSSION

This study has shown that the CIDR is an effective device for continuous delivery of progesterone to enable synchronisation of oestrus in dairy cows. Results obtained for onset of oestrus and conception rate to A.I. after synchronisation using the CIDR combined with PG therapy were not greatly different to those reported in similar studies in which other solid phase delivery systems were used, Heerche, et al. 1978; Hansel and Beal 1979, Thimonier et al. 1975; Smith et al. 1984. Moreover when the CIDR7 PG6 synchronisation regime was used, onset of oestrus was sufficiently precise to permit a fixed time insemination. Conception rate following A.I. at a fixed time was similar to that achieved in the control group after 25 days with conceptions occurring 11 days earlier in the CIDR7 PG6 synchronised group than in the unsynchronised control animals. Combined synchronisation treatment thus resulted in a significant reduction in the mating period.

When the CIDR was used alone the time of oestrus was not sufficiently precise to allow A.I. at a fixed time. However, the majority of animals were presented for insemination within the first five days of mating. The CIDR alone can therefore be used to reduce the mating period since in this trial 62% of animals had conceived within 25 days whereas control animals took 42 days to achieve the same conception rate. The retention rates for the CIDR devices were low, (87%), because the CIDR device used in this trial was primarily designed for use in heifers. The CIDR devices for parous cows were still in the developmental stage and were not available at the time of this trial. An improved device has now been developed for use in both heifer and parous cows which should increase retention rate.

The CIDR device has the potential to provide farmers with a simple technique for effective synchronisation of oestrus in dairy cattle when used either alone without veterinary supervision or combined with veterinary prescribed luteolytic agents.

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