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# THE SUCCESSFUL DEVELOPMENT OF A PRID REGIME FOR OESTROUS SYNCHRONIZATION IN NEW ZEALAND BEEF CATTLE

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## SUMMARY

A series of trials to study factors affecting the efficacy of the PRID treatment is described. The PRID is more readily retained in the vagina than are intravaginal sponges. The conception rate to insemination (AI) 56 h after PRID removal was affected by the time of onset of oestrus, with the highest rates achieved in cows exhibiting oestrus between PRID removal and AI. Short-term treatment (10 days) resulted in more cows showing oestrus between PRID removal and AI and higher conception rates to a fixed-time AI than did longer treatments (14 or 20 days).

Oestrogen pre-treatment at PRID insertion increased the proportion of animals showing oestrus by AI compared with non-treated animals, and increased the conception rate to the timed AI. Oestradiol valerate (5 mg) administered intramuscularly at PRID insertion was superior to oestradiol benzoate (10 mg) administered intravaginally through a gelatin capsule. Temporary removal of calves from cows for the 56 h between PRID removal and AI (Shang treatment) increased both the incidence of cows showing oestrus by AI and the conception rate to the timed AI. The efficiency of the PRID treatment was also affected by the interval from calving to PRID insertion, with poor conception rates obtained in animals treated prior to 40 days *post partum*.

The use of a 10-day PRID treatment augmented with oestrogen at the time of insertion and accompanied by temporary calf removal for the 56 h period between removal and AI is a very satisfactory technique for the synchronization of oestrus in suckling beef cows in New Zealand. Provided the treated animals are at least 40 days *post partum* and in good condition, approximately 60% of them can be expected to conceive to a single timed AI after this regime.

## INTRODUCTION

Increased usage of superior bulls and artificial insemination (AI) in New Zealand beef herds is dependent upon the development of a simple and effective system of oestrous synchronization. The use of prostaglandins has not proved successful for a large-scale synchronization of suckling beef cows in New Zealand because of the high level of anoestrus at the start of the mating season (Smith, 1977). However, satisfactory results have been obtained with the use of an intravaginal progesterone treatment (Smith, 1978; Smith *et al.*, 1978).

This paper reviews the results of a series of experiments with the PRID (progesterone releasing intravaginal device; Abbotts) conducted over the past 5 years on suckling beef cows, and highlights the factors affecting the efficacy of the system proposed for use in New Zealand.

## MATERIALS AND METHODS

### ANIMALS

The cows used in these trials were from 400 cow herds of either Angus (Crater Block, Rotorua) or Hereford (Haldon Station, Fairlie). Animals were allocated to treatments on the basis of age and date of calving.

### MATING MANAGEMENT

Treatment of the cows was timed so that the synchronized oestrus and inseminations coincided with the commencement of the normal mating period on the property. Animals were treated on average at 55 days *post partum*.

All treated cows were (unless otherwise specified) inseminated once 56 h after removal of the PRID. The Angus cows were inseminated with 1 ml liquid Hereford semen at a dose of  $10 \times 10^6$  sperm. The Hereford cows were inseminated with deep-frozen semen from one of a number of Hereford bulls, using 0.5 or 0.25 ml straws containing approximately  $25 \times 10^6$  sperm. The cows were then subsequently joined with entire bulls for an 8- to 10-week period of natural mating. The Angus cows were joined with Angus bulls and the Hereford cows with Charolais bulls. This enabled colour coding of the calves to the sire breeds and determination of the conception rate to the timed insemination.

### CALVING DATA

Calving dates were recorded for all cows. Calf weights at birth and weaning were also recorded at Haldon Station.

### OESTRUS DETECTION

The occurrence of oestrus was determined by the use of tail paint supplemented by visual observations of mounting activity.

### FACTORS EFFECTING THE EFFICACY OF THE PRID SYSTEM

#### LOSS RATE

The rate of loss of PRIDs (1 to 2%) is considerably lower than that reported for the intravaginal sponge (up to 40% in

similar type of cattle; Moore and Smith, 1980) and does not appear to be affected by cow age or parity status. This high level of retention is in agreement with other reports (Roche, 1976; O'Farrell, 1977).

#### DURATION OF TREATMENT

The effect of length of treatment (10, 14 or 20 days) was examined in three trials (Table 1). The animals treated for 14 or 20 days received no pre-treatment, while those treated with PRIDs for 10 days received a pre-treatment of oestrogen at the time of PRID insertion. The pre-treatment consisted of either 5 mg oestradiol valerate (OV) injected intramuscularly (i/m) or 10 mg oestradiol benzoate (OBD) in a gelatin capsule attached to the PRID. The shorter (10-day) treatment proved superior in all trials, with more cows showing heat between PRID removal and AI and significantly higher conception rates to the timed AI.

TABLE 1: EFFECT OF DURATION OF PRID TREATMENT

Trial	Treatment Duration	No. Cows Treated	% Cows	
			Oestrus <sup>2</sup>	Pregnant <sup>3</sup>
Haldon '75	10 days <sup>1</sup>	40	85	60*
	20 days	40	70	38
Crater '77	10 days <sup>1</sup>	265	78	49**
	14 days	82	70	28
Crater '78	10 days <sup>1</sup>	181	55	44**
	14 days	174	47	30

<sup>1</sup> Accompanied by oestrogen re-treatment at time of PRID insertion.

<sup>2</sup> In oestrus between PRID removal and AI (56 h).

<sup>3</sup> Pregnant to a single insemination 56 h after PRID removal.

This superiority of the short-term PRID treatment is similar to that obtained with short-term treatment with intravaginal sponges (Sreenan, 1975) and progestogen implants (Pelot *et al.*, 1975). Mawhinney and Roche (1978) have recently reported similar differences between short (9-day) and long (14-day) PRID treatments of dairy cows.

#### OESTROGEN PRE-TREATMENT

The need for the pre-treatment with oestrogen in conjunction with the 10-day PRID treatment was shown in a trial which compared two groups of cows both treated for 10 days (one group with, and one without oestrogen pre-treatment). The group

receiving the oestrogen pre-treatment had a higher percentage of cows in oestrus (78% vs. 61%) and pregnant (45% vs. 20%,  $P < 0.05$ ) than did the group without pre-treatment. The route of administration of the oestrogen also has an influence, with a 5 mg OV i/m injection being superior to intravaginal capsules containing 10 mg ODB. More cows were on heat (83% vs. 73%,  $P < 0.05$ ) and conceived (54% vs. 44%,  $P = 0.05$ ) after the injection than with the capsule.

The use of oestrogen as a luteolytic agent is necessary to obtain effective synchronization of oestrus with the short-term treatments, and similar results have been reported by Mauleon *et al.* (1978). However, the difference observed between the routes of oestrogen administration in the New Zealand trials is at variance with the report by Mawhinney and Roche (1978), who found no differences in routes of administration.

#### TEMPORARY CALF REMOVAL (SHANG)

The effect of temporary removal of calves from cows for the 56 h period between PRID withdrawal and AI has been investigated in three trials (Table 2). Calf removal improved both the incidence of cows showing heat by time of AI and the conception rate. However, the magnitude of the effect has varied from experiment to experiment. There has not been any adverse effect of this treatment on the weaning weight of the calves, but occasional problems with re-mothering were experienced with a few individual cows. Smith *et al.*, (1979) reported an increase in the number of cows exhibiting oestrus between end of progestogen treatment, ear implants and AI following calf removal, but they did not observe any improvement in conception rates.

TABLE 2: EFFECT OF TEMPORARY CALF REMOVAL

Trial	Treatment <sup>1</sup>	No. Cows	% Cows	
			Oestrus <sup>2</sup>	Pregnant <sup>3</sup>
Crater '78	Shang	147	66***	48***
	No Shang	208	40	30
Haldon '77	Shang	71	73***	43
	No Shang	73	51	42
Haldon '78	Shang	141	65	48
	No Shang	136	61	38

<sup>1</sup> Shang = calves removed for 56 h between PRID withdrawal and AI.

<sup>2</sup> Oestrus between PRID withdrawal and AI 56 h later.

<sup>3</sup> Pregnant to single insemination 56 h after PRID removal.

## EFFECT OF INCIDENCE OF OESTRUS ON CONCEPTION RATE

In all the experiments the conception rate to a single insemination 56 h after PRID removal was highest in those cows which had exhibited oestrus in the interval between PRID removal and AI (Table 3).

TABLE 3: EFFECT OF OESTRUS ON CONCEPTION RATE TO TIMED INSEMINATION

Trial	Oestrus <sup>1</sup>		Not Oestrus <sup>2</sup>	
	No. Cows	% Preg.	No. Cows	% Preg.
Haldon '76	44	64	22	23
Haldon '77	89	60	51	14
Haldon '78	174	56	62	34
Crater '76	108	68	152	38
Crater '77	257	52	80	20
Crater '78	181	54	174	20

<sup>1</sup> Oestrus between PRID removal and insemination 56 h later.

<sup>2</sup> Not-oestrus between PRID removal and insemination 56 h later.

A comparison of insemination on a time basis (56 h) after PRID removal with insemination on the detection of oestrus was made in the '78 Haldon trial. Insemination on detection for 7 days after PRID removal resulted in more cows being observed in oestrus than did insemination on a time basis (69% vs. 56%,  $P < 0.05$ ). The conception rates for cows seen in oestrus were similar (54% vs. 60%, respectively). However, on the basis of the number of cows treated the conception rate was slightly higher for the timed insemination group (48% vs. 38%) owing to cows which were not detected in oestrus conceiving to the timed insemination. Thus under the conditions of this experiment the best results were obtained with the fixed-time mass insemination.

## EFFECT OF INTERVAL FROM CALVING TO TREATMENT ON CONCEPTION RATES

The effect of the interval from calving to insertion of PRIDs on conception to a single insemination has been examined in four of the trials. These data (Table 4) show that treatment prior to 30 days *post partum* is followed by a very low conception rate, and that this increases with time *post partum*. From about 40 to 50 days *post partum*, however, there does not appear to be any marked increase in conception rate with further increases in the calving-to-treatment interval.

TABLE 4: EFFECT OF INTERVAL FROM CALVING TO PRID INSERTION ON CONCEPTION RATES<sup>1</sup>

<i>Interval from Calving to Treatment (days)</i>	<i>No. Cows Treated</i>	<i>% Pregnant<sup>2</sup></i>
0- 9	12	8.3
10-19	22	22.7
20-29	52	23.1
30-39	109	33.9
40-49	169	43.8
50-59	205	44.9
60-69	230	45.7
70-79	136	46.3
80+	16	56.3

<sup>1</sup> Includes all cows and all PRID treatments in the 1977 and 1978 trials at both Haldon and Crater.

<sup>2</sup> Pregnant to single AI: 56 h after PRID removal.

#### COMPARISONS WITH UNTREATED CONTROL COWS

Where untreated control cows were included in an experiment, the mating of these animals commenced at the same time as the AI of the PRID treated cows, and the conception rate of the controls after 3 weeks of mating was compared with that following the single insemination of the treated cows (Table 5).

The conception rate on a per-herd or group basis was similar after a single timed AI in the treated cows and 3 weeks of natural mating or daily AI in the control cows. To equal the conception rate of 50 to 55% obtained in the treated cows to the single insemination, 70 to 75% of the control cows would have to be detected in oestrus in the first 3 weeks, and 70 to 75% of these would have to conceive.

TABLE 5: CONCEPTION RATE OF TREATED AND CONTROL COWS

<i>Trial</i>	<i>Treatment</i>	<i>No. Cows Treated</i>	<i>% Pregnant</i>
Crater '76	10-day PRID	131	55
	Control <sup>1</sup>	114	50
Haldon '76	10-day PRID	66	50
	Control <sup>2</sup>	78	39
Crater '77	10-day PRID	259	49
	Control <sup>1</sup>	76	47

<sup>1</sup> 21 days of natural mating.

<sup>2</sup> 21 days of daily AB.

## CONCLUSIONS

The use of a 10-day PRID treatment augmented with oestrogen at the time of insertion, together with temporary calf removal for the 56 h period between withdrawal and insemination, has proved a most satisfactory technique for the synchronization of oestrus in suckling beef cows in New Zealand. The animals should be at least 40 days *post partum* and in good condition. The system has produced poor results in another herd that was in very poor condition owing to poor winter-spring nutrition. Overseas data indicate improved conception rates with increased body condition and supplementary feeding (Drew, 1978; Mulvehill and Sreenan, 1978). Further research on the effects of level of nutrition and method of oestrogen administration is needed. The latter is important for animal health regulatory reasons, and since the vaginal route would be the most satisfactory from this aspect, studies on the optimum dose level in the capsule must be undertaken.

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