Use of pregnant dairy cows in product development of the intravaginal progesterone releasing (CIDR) device

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INTRODUCTION

This study aimed to confirm that pregnant cows could be used to study release rates of progesterone (P4), the hormone of 'pregnancy', from the CIDR device without compromising pregnancy. The seasonal nature of the New Zealand dairy operation presents only a brief window for large scale CIDR studies, if the treatment system is limited to non-pregnant cows.

MATERIALS AND METHODS

Experiment 1. A CIDR-B device was inserted for 7 days into the vagina of each of 12 lactating Friesian cows (T) which were 4-6 months pregnant. Another 12 contemporaries of the same breed and stage of gestation served as a control group (C). A blood sample was collected from each cow before device insertion, 2 h after insertion, just before removal 7 days later and 4 h after removal. Composite milk samples were collected from all cows on the 5th day of treatment and subsequently at weekly intervals for the next 4 weeks. Concentrations of P4 in blood plasma (PP4) and whole milk (MP4) were determined using a RIA.

Experiment 2. Each of 132 cows in 3 dairy herds had a prototype CIDR device inserted into the vagina. The shape and P4 content in these devices varied only slightly from the CIDR-B. On each of 12 subsequent days (except the 11th day), 12 devices were removed. Calving details of these animals were compared with untreated contemporaries at the same stage of gestation.

RESULTS AND DISCUSSION

In Experiment 1, PP4 increased by 5.8 ng/ml at 2 h after a CIDR was inserted into T cows, but was not significantly different to C cows after 7 days of treatment (Table 1). The change in PP4 following device removal was relatively small in T cows, and not significantly different to the change in C cows over the same period (Table 1). We find similar increases in PP4 in ovariectomised cows following insertion of a CIDR device, but levels are maintained at around 3 ng/ml after 7 days of treatment. The most likely explanation for the difference relates to differences in metabolic rate and P4 clearance.

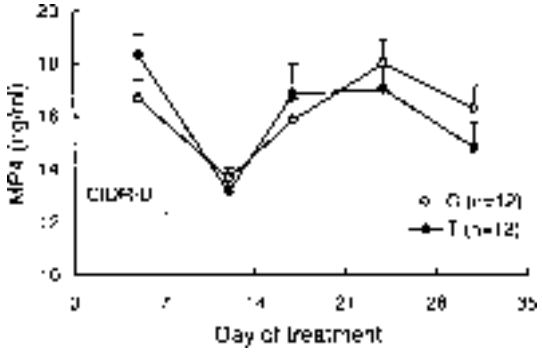
This inference is further supported by the finding that MP4 varied by day ($p<0.05$), but not by treatment ($p>0.1$: Fig. 2).

The overall observed abortion rate was 2% and did not differ between treated animals (Expt.1, 1 of 12; and Expt.2, 2 of 132) and their untreated contemporaries (0 of 12 and 11 of 531).

TABLE 1: Concentrations of progesterone in plasma (PP4: ng/ml (± sem) in pregnant dairy cows treated with a CIDR-B device for 7 days (T) versus untreated (C).

	CIDR	T	C
In:	before	7.9 (0.7)	7.8 (0.3)
	2 h after	13.7 (0.8)	8.5 (0.3)
	change	+ 5.8 (0.5)	+ 0.7 (0.3)
Out:	before	9.5 (0.5)	8.8 (0.4)
	4 h after	8.1 (0.7)	8.4 (0.5)
	change	- 1.4 (0.5)	- 0.4 (0.5)

FIGURE 2: Concentrations of progesterone in milk (MP4 + sem) in pregnant dairy cows treated with a CIDR-B device for 7 days (T) verses untreated (C).



CONCLUSIONS

These studies suggest that the pregnant cow will adjust P4 clearance to maintain stable P4 levels in blood and milk, and that an established pregnancy will not be compromised by insertion of the CIDR device.

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