

HORMONE SUPPLEMENTATION TO INCREASE FERTILITY AFTER UTERINE
ARTIFICIAL INSEMINATION IN EWES

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SUMMARY

A flock of 283 Merino ewes, had oestrus synchronized with CIDR devices containing 9% progesterone. At CIDR removal the ewes were divided into four groups. Group 1 had a 2nd CIDR inserted during days 10 to 16 after removal of the first CIDR. Group 2 received 400 iu of PMSG at CIDR removal. Group 3 received both PMSG and a second CIDR. Group 4 had no hormone treatment and served as controls. All ewes underwent intrauterine A.I. at 50-56 h after CIDR removal. PMSG increased the proportion of ewes showing oestrus 36 h after CIDR removal. Exogenous progesterone given during days 10 to 16 increased number of fetuses per ewe joined and number of fetuses per ewe pregnant from 57% and 105% in controls to 83% and 125% respectively. Combined treatment with PMSG and progesterone increased the number of fetuses per ewe pregnant to 128%. The results suggest that progesterone, if given over days 10-16 of pregnancy, can cause a reduction in embryo mortality. Keywords: ewes, fertility, uterine A.I., progesterone, PMSG.

INTRODUCTION

A technique for intrauterine insemination of ewes has been developed by Killeen and Caffery (1982) which allows insemination with doses of sperm much lower than that used for cervical insemination without any reduction in fertility. However, since the technique is labour intensive and therefore expensive any treatment which increases fertility to the intrauterine insemination would be worthwhile. Peterson et al. (1984) increased lambing rate from 67% in control ewes to 95% in ewes which were supplemented with exogenous progesterone from days 10 to 16 after removal of a synchronizing device. The progesterone was supplied by a 'Controlled Internal Drug Release' (CIDR) device which contained 9% progesterone inserted into the vagina. The ewes were initially synchronized with CIDR devices inserted for 12 days. Reports on the use of CIDR devices (Welch, 1983; Peterson et al. 1984) do not mention the use of Pregnant Mare Serum Gonadotrophin (PMSG) in conjunction with CIDR devices. When using intra-vaginal sponges it is recommended that 400-500 iu of PMSG be injected at sponge removal to make synchronization more precise. The mild superovulation also has the effect of increasing lambing percentage. This paper reports on the efficacy of CIDR devices for the synchronization of oestrus both with and without PMSG and the effect on fertility of administration of progesterone and PMSG.

MATERIALS AND METHODS

In November 1984, 283 Merino ewes had CIDR devices inserted for 12 days. At CIDR removal the ewes were allotted at random to the following four groups. Group 1 - Reinsertion of CIDR containing 9% progesterone from days 10 to 16 after removal of the synchronizing CIDR. Group 2 - Injection (im) of 400 iu of PMSG (Folligon, Intervet) at the removal of the first CIDR. Group 3 - Combined treatments of Groups 1 and 2. Group 4 - Control.

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After removal of the synchronizing CIDR devices ewes were joined with 4% of vasectomized rams. Ewes were checked for oestrus at 36, 48 and 54 hours after CIDR removal. Ewes were inseminated 50 to 56 hours after CIDR removal in the order in which they had shown oestrus. Three rams were used and semen was collected by artificial vagina. Each ejaculate was assessed microscopically for percentage motility and total sperm numbers were counted using a haemocytometer. Each ejaculate was **diluted** individually with UHT skim milk to provide a concentration of 20×10^6 sperm in 0.1 ml of diluted semen which was held in a water bath at 32°C . Ewes were inseminated with 0.05 ml of diluted semen into each uterine horn with the aid of a laparoscope. Pregnancy rate and the number of foetuses present were determined by ultrasonic scanning 70 days after insemination. Statistical significance was determined by least squares analysis of variance.

RESULTS

The effect of PMSG on the onset of oestrus after CIDR removal is shown in Table 1. Ewes which lost CIDR's, 2.8%, were excluded from all analyses.

Table 1 Cumulative percentage of ewes showing oestrus at different times after CIDR removal

Treatment group	Hours after CIDR removal		
	36	48	54
+PMSG (2&3)	53 ^a	84 ^c	89 ^c
-PMSG (1&4)	40 ^b	81 ^c	89 ^c

a, b, c data with unlike superscripts differ, $P < 0.05$.

The effect of the hormone treatments on number of foetuses per ewe joined, pregnancy rate and number of foetuses per ewe pregnant is shown in Table 2.

Table 2 Fertility of ewes after hormone treatment (%)

Group	<u>Foetuses</u>	<u>Ewes pregnant</u>	<u>Foetuses</u>
	<u>Ewes joined</u>	<u>Ewes joined</u>	<u>Ewes pregnant</u>
1. Progesterone	83 ⁺	66	125 ⁺
2. PMSG	74	61	120
3. Prog.+PMSG	73	57	128 ⁺
4. Control	57	54	105

⁺ significantly different from other treatments, $P < 0.05$.

Treatment with progesterone on days 10 to 16 after CIDR removal increased number of foetuses per ewe joined and number of foetuses per ewe pregnant. There was an interaction between progesterone and PMSG on the number of foetuses per ewe pregnant.

DISCUSSION

Administration of 400 iu of PMSG at CIDR removal increased the proportion of ewes showing oestrus 36 hours later. However this effect had disappeared by 48 hours. The timing of insemination after removal of **Chronogest** sponges has been shown by Maxwell (1984) to affect lambing rate. Lambing rate to intrauterine A.I. in that study increased from 18% to 57% between 36 and 60 hours respectively. Because of this effect of the timing of insemination there may be no advantage in using PMSG to bring forward the onset of oestrus. For example in this present study 81 - 89% of ewes were in oestrus by the time of A.I. 50 - 56 hours after CIDR removal.

Treatment of ewes with progesterone from days 10 to 16 after removal of the synchronizing device increased both the number of foetuses per ewe joined and the number of foetuses per ewe pregnant thus confirming the work of Peterson et al. (1984). This effect was probably achieved through a reduction of early embryo mortality. The increase in number of foetuses per ewe pregnant in the group which received PMSG and progesterone is probably due to a mild superovulation caused by PMSG and a reduction in embryo mortality due to progesterone treatment.

An increase in the number of foetuses per ewe joined of the order achieved with progesterone supplementation warrants further investigation. Development of more convenient delivery systems or other means of ensuring optimal concentrations of progesterone in plasma also needs to be studied.

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