FERTILITY OF EWES FOLLOWING INTRA-UTERINE INSEMINATION USING A LAPAROSCOPE COMPARED WITH OTHER METHODS

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INTRODUCTION

Artificial insemination of ewes with frozen semen deposited in the vagina or cervix generally results in much lower fertility (ewes lambing per ewe inseminated) compared with similar insemination with fresh or chilled semen (Maxwell *et al.* 1980). In the past, intra-uterine insemination involving laparotomy (exteriorising the uterus – Lightfoot & Salamon 1970) or forceful entry to the uterus through the cervix (Fukui & Roberts 1976) have not proved very successful.

Recently, two new methods of intra-uterine insemination have been developed. A series of field trials was conducted to test the fertility achieved by these methods in terms of pregnancy and lambing rates in Merino ewes. The controls used were cervical insemination with fresh semen or natural mating.

MATERIALS AND METHODS

Ejaculates collected from Merino rams were diluted with a tris-based diluent (Visser & Salamon 1973) and frozen by the pellet method (Salamon 1976). The frozen pellets were stored in liquid nitrogen for one month before use for insemination. On the day of experimental insemination, fresh semen was also collected from the same rams, diluted with reconstituted skim milk (Colas *et al.* 1968), and used for insemination within 1 hour.

Oestrus was synchronised in ewes, using progestagen sponges (30 mg Chronogest, Intervet, Australia Pty Ltd) inserted for twelve days. At sponge removal, ewes received an injection of 400 IU PMSG (Gravamed, Beresford Laboratories, Melbourne) and were joined with 10 per cent vasectomised rams.

Two comparisons (tests) were conducted. Control ewes either received fresh semen by cervical insemination (0.1 ml of semen containing 100 x 10^6 motile spermatozoa) or were joined with a single sire in a 1-ha mating plot (one ram : ten ewes). Experimental ewes received frozen-thawed semen by either intra-uterine insemination using a laparoscope (Killeen & Caffrey 1982) to locate the uterus, or intra-uterine insemination through the cervix using a cervical traction method ('Econoram', Kevin Gobby Surgical Equipment, Balcatta, Western Australia). For each intra-uterine insemination, a volume of 0.04 ml was used containing 40 x 10^6 motile spermatozoa.

Fertility was measured in two ways. In Test 1, fertility was assessed as the proportion of ewes pregnant at slaughter a hundred days after insemination when the reproductive tracts were examined. The proportion of ewes lambing was used as the measure of fertility in Test 2.

RESULTS AND DISCUSSION

The results are summarised in Table 1.

Table 1: Pregnancy or lambing following insemination of ewes

Test	*Insemination Method*	*No. Ewes Inseminated*	*Fertility (%)**
Test 1	Cervical insemination fresh semen	46	33 (71.7)[a†]
	Laparoscopic insemination frozen semen	69	36 (52.2)[a]
Test 2	Cervical insemination fresh semen	212	105 (49.5)[a]
	Natural mating single sire	52	22 (42.3)[a]
	Cervical traction (Econoram) frozen semen	98	2 (2.0)[b]
	Laparoscopic insemination frozen semen	296	157 (53.0)[a]

* Measured as number (proportion) of ewes pregnant or lambing.
† Values within tests with common superscript do not differ ($p < 0.05$).

The results indicated that intra-uterine insemination with frozen semen using a laparoscope at a synchronised oestrus could be as effective as cervical insemination with fresh semen or natural (single-sire) mating over one synchronised cycle. Intra-uterine insemination by the cervical traction method resulted in poor fertility. The laparoscopic insemination technique proved more efficient than cervical insemination because of the relatively small dose of semen used (0.04 ml, containing 40 million spermatozoa, for laparoscopic insemination cf. 0.2 ml, containing 200 million spermatozoa, for cervical insemination).

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