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SUCCESSFUL SEMI-COMMERCIAL ARTIFICIAL INSEMINATION OF EWES

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SUMMARY

Artificial insemination (AI) was successful as an alternative to natural service in single sire mating groups. Conception rate to first service was lower with AI (65%) than for pen (68%) or paddock mating (80%), but the proportion of ewes lambing to a seven-week mating period was comparable for AI (92%) and paddock mating (93%) and higher than for pen mating (88%).

No sire or ewe breed differences were noted for conception rate in any of the mating systems although the flightly nature of Booroola merinos made them more difficult to train for semen collection.

AI required more technical expertise than pen mating but less capital intensive facilities. It was more labour intensive than pen mating, particularly when ram training was included, but during the mating period required mustering and drafting of marked ewes only once, rather than twice, daily.

INTRODUCTION

The 1980 sheep research trials at Rotomahana Research Station required more single-sire mating groups than could be accommodated by existing paddocks and pen-mating facilities. Artificial insemination (AI) was chosen as a potentially viable alternative mating system in light of high costs for sub-division fencing and/or construction of additional pens.

The goal of the mating programme was production of a moderate number (20-25) of daughters from each representative sire when mated to 35-50 pre-allocated ewes. Hence the aim was not for maximum reproduction from highly selected rams and the need for detailed recording at lambing precluded oestrus synchronisation at mating. Because of these conditions and the desire to achieve high conception rates despite limited AI experience, it was decided to use fresh undiluted semen collected daily and used within 10 minutes of collection.

MATERIALS AND METHODS

The overall mating programme contained 84 rams of 7 breeds (12 genotypes) (Table 1). All rams were mated exclusively to ewes of their own breed apart from Booroola merino rams (Romney and Perendale ewes) and Coopworth and Border Leicester rams (Romney ewes only). Rams of each genotype were allocated to all three mating systems (pen, paddock, AI) to avoid confounding of genotypes with mating systems. In total, 19 rams and 860 ewes were assigned to AI mating. Considerable variation was observed among rams in both libido and semen quality and/or quantity, particularly at the initiation of training during January high temperatures.

TABLE 1: 1980 ROTOMAHANA MATING PROGRAMME
— NUMBER OF MATING GROUPS

Ram breed	Mating system		
	AI	Pen	Paddock
Romney ^a	7	11	20
Border Leicester	1	1	3
Coopworth	1	1	3
Perendale	2	3	3
Booroola merino	3	5	3
Southdown	2	2	4
Suffolk	3	2	4
Total No. rams	19	25	40
Total No. ewes	860	1180	1850

^aIncludes 6 Romney 'strains'

All rams were blood-tested for *Brucella ovis* upon arrival at the station and held in isolation until diagnosed free of disease. Rams were trained for semen collection by allowing them to mount and serve restrained 'teaser' (hormonally treated ovariectomised) ewes in the presence of the trainer. As rams became more familiar with the trainer and setting, an artificial vagina was introduced for semen collection. Several rams of each genotype were started on the AI ram training and semen collection system with the quickest learners assigned to AI and the remainder allocated to the other mating systems.

Ewes were run with harnessed vasectomised Dorset and Romney teaser rams and marked ewes were drafted each morning for insemination. Rams were housed indoors overnight, semen-collected in the morning and grazed outdoors during the day. Marked ewes

were presented for insemination in the sequence corresponding to the order of ram collection.

Each ejaculate was examined under a microscope, measured for volume, apportioned into aliquots depending on the number of ewes to be inseminated, and loaded into pipettes. Each ewe received between 0.1 and 0.3 ml of semen depending on ejaculate volume and number of ewes to be inseminated. Generally, one ejaculate was adequate for inseminating up to eight ewes. On occasions when a single ejaculate was inadequate, little difficulty was experienced in quickly making a second collection.

Ewes were inseminated standing in a raised pivoting clamshell clamp with posterior slightly elevated. Insemination pipettes were inserted into the vagina through an illuminated speculum. The volume of semen, condition of vagina and ease of insemination were recorded for each ewe. Inseminators endeavoured to deposit semen in the cervix but this was not always possible. Each ewe received a single insemination per oestrus and was remated to the same ram if returning to service.

RESULTS AND DISCUSSION

Conception rates based on actual lambing performance for the three mating systems are shown in Table 2. The overall conception rate for a seven-week mating period was 92% for AI compared to 88% for pen mated and 93% for single-sire paddock mated groups. During the early stages of AI mating, difficulties were experienced with one Border Leicester and two Booroola merino rams which became unco-operative for semen collection. Lack of interest in the teaser ewe was short-lived for the Border ram and he quickly returned to the normal semen collection routine. The two Booroolas remained disinterested in the teaser ewe despite a brief period of successful natural mating with pre-assigned ewes. These two rams were therefore removed along with their respective groups of ewes to mating paddocks where conception rates thereafter were normal, and they are excluded from the summary in Table 2.

TABLE 2: CONCEPTION RATES (% EWES LAMBING)

<i>Mating system</i>	<i>1st service</i>	<i>1st and 2nd service</i>	<i>Overall</i>
Artificial insemination	64.9	86.0	92.1
Pen mating	68.8	84.1	87.9
Paddock mating	80.4	92.0	93.2

The lower conception rate to first service in the AI trial probably reflects the inexperience of inseminators and the conservative approach of inseminating any ewe thought to possibly be in oestrus. There was a high incidence of false teaser marks over the first few days of mating as indicated by short length of return to subsequent service. It was also found that Southdown ewes were not being adequately marked by teasers, so any Southdown ewe with even a suggestion of a teaser mark was inseminated. The same problems applied to pen mating where teaser-marked ewes were likewise drafted for joining with entire rams. Overall there was no indication of either a ewe or ram breed effect on conception rate. However the two were largely confounded and ram breeds were generally represented by small numbers in each mating system.

The influence of inseminator on conception to AI is shown in Table 3. The effect of inseminator is thought to be due to technique, since the inseminator having greatest difficulty in depositing semen in the cervical folds had the lowest conception success to first service. This may have been due to the site of semen deposition or more likely to chilling of the semen during insemination delays. It was subsequently decided that although the cervix has the preferred site for deposition, time delays were critical and some compromise was made to the accuracy of semen placement. Thereafter conception rates were similar for all inseminators.

TABLE 3: VARIATION IN PLACEMENT OF SEMEN AND CONCEPTION RATES AMONG INSEMINATORS

	<i>Inseminator</i>		
	<i>A</i>	<i>B</i>	<i>C</i>
% ewes inseminated in cervix	92	87	81
% ewes conceiving to first service	71	64	61

Considerable variation was observed in the intensity of teaser tup marks depending on weather conditions, crayon colour, number of ewes on heat and breed of ewe. Southdown ewes were only very lightly marked, possibly due to their size or to teaser preference for other ewe breeds. Conception rate to first AI service (Table 4) was lowest for ewes with very light ('rape') marks, often made by teasers briefly mounting non-oestrous ewes at opportune moments. Only a small proportion of ewes were heavily marked by the teaser rams.

TABLE 4: EFFECT OF INTENSITY OF TEASER MARK ON CONCEPTION TO FIRST AI SERVICE

<i>Teaser mark intensity</i>	<i>% ewes</i>	<i>% conception</i>
'Rape'	31	51
Light	39	74
Medium	26	69
Heavy	4	67

The moist or dry condition of the ewe's vagina at the time of insemination, probably an indicator of oestrous status, was related to conception success. Ewes coded as being 'very moist' had a 79% conception rate to first AI service while only 38% of ewes noted as having 'dry' vaginas conceived.

Observed variation in semen quality and quantity had little effect on conception rates. This was not unexpected since the visually assessed quality was high for all semen used and sperm counts were probably seldom below 250×10^6 sperm per insemination.

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