

THE INFLUENCE OF AGE AND SEX STRUCTURE AND OF REPRODUCTIVE PERFORMANCE ON THE PRODUCTION FROM A SELF-REPLACING FLOCK

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Summary

Data from south western Victoria is used in a study of the effects of sex and age structure, level of reproductive performance, and selling policies for wethers on both the physical and economic output from self-replacing sheep flocks.

Within the restraints imposed in this study it appears that greater profitability is associated with increasing proportions of breeding ewes in the flock, with greater than three age groups of breeding ewes and with high reproductive performances among the ewes.

However, it is concluded that more exhaustive studies are required in order to determine optimum flock structures.

I. INTRODUCTION

The influence of age and reproductive performance upon the wool production of ewes has been studied by a number of workers, e.g. Turner, Brown and Ford (1968); Mullaney *et al* (1969). Such data provides a basis for the calculation of gross changes in the output of wool as the age structure of the female portion of the flock is varied.

There appears to be a lack of published information in Australia relating the age and wool production of wethers. However, as with ewes, annual production may be expected to rise until the animals reach about five years old and thereafter to decline.

In a self-replacing flock of fixed total size, a number of surplus sheep will become available for sale each year. These will usually comprise young replacement ewes and wethers, prime mutton animals and secondary mutton or "canner" type animals.

In response to changing markets, it may be possible to manipulate the age and sex structure of existing flocks in order to vary the relative proportions of each class of surplus sheep produced annually, and hence maximize the value of total production.

This paper presents one such study based on experimental results from Corriedale flocks at Hamilton in south-western Victoria, and also examines some effects of reproductive performance and selling policies for wethers on both the physical and economic output from self-replacing flocks.

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TABLE 1
Levels considered for each component of flock structure and performance

Component	Levels considered
Proportion of breeding ewes in flock	0.3, 0.4, 0.5
Number of age groups of breeding ewes	3, 4, 5
Proportion of lambs weaned to ewes joined:	
maiden ewes	0.75 } Low 0.85 } Medium 0.95 } High
adult ewes	0.85 } 0.95 } 1.05 }
Proportion of sheep dying in each year:	
6 months to 18 months	0.05
over 18 months:	
ewes	0.03
wethers	0.02
Wether selling policies‡ (other than as lambs)	A — First sales at 1½ years, balance at 2½ years. B — First sales at 2½ years, balance at 3½ years. C — all sales at 5½ years.

‡Each policy to be consistent with the maintenance of total flock size for its implementation.

TABLE 2
Production of surplus sheep from each flock structure

Proportion* of ewes in flock	No. of* ewe age groups	Reproduc- tion level	Number of surplus animals per 1000 sheep														
			Ewe lambs			Wether lambs			Young wethers			Prime wethers			Secondary mutton		
			Wether policy			Wether policy			Wether policy			Wether policy			Wether policy		
			A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
.30	3	M	—	—	20	—	—	11	—	—	0	—	—	104	—	—	99
	3	H	—	—	45	—	—	26	—	—	0	—	—	104	—	—	99
	4	M	—	—	57	—	—	7	—	—	0	—	—	110	—	—	76
	4	H	—	—	73	—	—	23	—	—	0	—	—	110	—	—	76
	5	M	—	—	73	—	—	6	—	—	0	—	—	112	—	—	60
	5	H	—	—	89	—	—	22	—	—	0	—	—	112	—	—	60
.40	3	L	—	19	19	—	0	65	—	0	0	—	142	82	—	132	129
	3	M	—	39	39	—	0	85	—	0	0	—	161	82	—	134	129
	3	H	—	60	60	—	0	106	—	0	0	—	178	82	—	135	129
	4	L	—	—	55	—	—	61	—	—	0	—	—	87	—	—	96
	4	M	—	75	75	—	0	81	—	0	0	—	163	87	—	99	96
	4	H	—	94	94	—	0	100	—	0	0	—	181	87	—	100	96
	5	L	—	—	78	—	—	58	—	—	0	—	—	91	—	—	78
	5	M	—	98	98	—	0	78	—	0	0	—	163	91	—	82	78
	5	H	—	117	117	—	0	97	—	0	0	—	182	91	—	82	78
.50	3	L	26	26	26	0	42	137	82	0	0	107	146	56	163	165	160
	3	M	50	50	50	0	66	161	129	0	0	85	146	56	161	165	160
	3	H	76	76	76	0	92	187	180	0	0	61	146	56	160	165	160
	4	L	72	72	72	0	19	128	38	0	0	149	168	66	125	125	120
	4	M	97	97	97	0	44	153	87	0	0	125	168	66	124	125	120
	4	H	122	122	122	0	69	178	136	0	0	102	168	66	123	125	120
	5	L	97	97	97	0	8	124	16	0	0	170	179	68	100	99	95
	5	M	122	122	122	0	33	149	65	0	0	147	179	68	99	99	95
	5	H	147	147	147	0	48	174	114	0	0	124	179	68	97	99	95

*includes breeding ewes only.

II. MATERIALS AND METHODS

(a) General assumptions

It was assumed that the flocks were maintained at a constant size of 1000 by selling surplus sheep off-shears each autumn; that the breeding flocks consisted of all ewes older than 1½ years (mated each year in April), and that no selection for production characteristics was carried out within the flocks.

(b) Levels considered for various components of flock structure and performance

These are shown in Table 1.

(c) Calculation of returns

The following prices were used for the calculation of gross returns: Wool 70.6c/kg (net average); prime mutton 15.4c/kg; inferior mutton 8.8c/kg; ewe lambs \$2.00/head; wether lambs \$1.50/head; young wethers (13 years) \$2.50/head.

The annual variable costs per head were: Lambs (from weaning to shearing only) 45c; young ewes 80c; wethers 80c; breeding ewes \$1.00. These costs include shearing, drenching, mating, etc., but do not take account of handfeeding or interest charges.

(d) Experimental data used in calculations

Fleece weight and liveweight data were selected from groups of animals carried at low to moderate stocking rates.

(i) Wool production

Adjustments were made for the effects of age and lambing performance on wool production of ewes. The pattern of these adjustments closely resembled that described for Corriedales by Mullaney *et al* (1969).

The variation in wool production with age of wethers was based on an assumed pattern similar to that of the ewes.

(ii) Carcass weights

Carcass weights were calculated as being 47 per cent of the liveweights of both wethers and ewes after shearing in the autumn. It was assumed that 95 per cent of the wethers of each age group from 2½ years to 5½ years were saleable as prime mutton animals with a mean carcass weight of 25.4 kg. The balance of the wethers in this age range together with all cast-for-age ewes were of inferior mutton quality with a mean carcass weight of 18.1 kg.

III. RESULTS AND DISCUSSION

(a) Wool production

Total wool production was not greatly influenced by variation in the proportion of ewes in the flock, the number of ewe age groups or the level of reproductive performance. Flocks retaining wethers until 5½ years had a consistently higher total production of wool than flocks with policies A or B, but the range of wool outputs over all flocks was less than 6 per cent.

(b) Surplus sheep

The numbers of each class of surplus sheep available for sale each year are shown in Table 2. Although the flock structures, reproductive levels and selling policies considered are commonly found in the industry, some 40 per cent of the combinations studied were impracticable. In almost all these cases, the breeding

TABLE 3
Relative returns and gross margins from each flock structure*

Reproduction level	Wether policy	Proportion of breeding ewes in flock								
		.30			.40			.50		
		Number of ewe age groups								
		3	4	5	3	4	5	3	4	5
Low	A							98 (96)	101 (100)	102 (101)
	B				96 (96)			99 (97)	101 (100)	102 (101)
	C				94 (93)	95 (94)	96 (96)	95 (93)	98 (96)	98 (96)
Medium	A							100 (98)	103 (102)	104 (103)
	B				99 (99)	100‡ (100)	101 (101)	101 (100)	104 (103)	104 (104)
	C	93 (93)	95 (96)	95 (96)	96 (95)	97 (96)	98 (98)	98 (95)	100 (98)	100 (99)
High	A							102 (100)	105 (104)	105 (105)
	B				101 (101)	103 (103)	104 (104)	104 (103)	106 (106)	107 (106)
	C	95 (95)	97 (97)	97 (98)	98 (97)	99 (98)	100 (100)	100 (98)	103 (101)	103 (101)

*Gross margins shown in brackets.

‡Base value for gross returns = \$4,425 per 1000 sheep.

Base value for gross margins = \$3,378 per 1000 sheep.

flocks were quite incapable of generating sufficient replacement sheep for the particular policy requirements to be satisfied.

However, it should be emphasized that producers have much greater flexibility in defining and implementing tactics particularly in regard to selling policies.

(c) Returns and gross margins

There was a marked trend for returns and gross margins to increase as the proportion of ewes in the flock was increased (Table 3). Improved reproductive performance within the various flock structures was associated with higher returns and gross margins, and reflects the increased numbers of saleable weaner sheep of both sexes.

Wether policy B (sales at 2½ years) in general produced the highest returns and gross margins, particularly when more than three age groups of breeding ewes were retained in the flock.

Whilst more exhaustive and detailed studies are required to determine optimum flock structures and management policies for self replacing flocks, the present study suggests that only relatively small gains in profitability may be achieved by manipulation of age and sex structures in existing flocks. It may be that some change in genotype is needed to effectively develop meat production as a major contributor to income from sheep.

IV. ACKNOWLEDGMENTS

Thanks are due to Messrs. R. L. Thompson, J. S. McIntyre and J. N. Walduck for assistance in calculating the results, and to Dr. P. D. Mullaney and Mr. R. Jardine for helpful discussion.

The study forms part of a project supported by the Australian Wool Research Trust Fund.

V. REFERENCES

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