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Author:	A. J. Kennedy, M. B. Ferguson, G. B. Martin, A. N. Thompson and D. J. Pannell
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Profit is maximised in a Merino prime-lamb enterprise when mature size is 60–70 kg

A. J. Kennedy[A,B,C,D], *M. B. Ferguson*[B,C], *G. B. Martin*[A], *A. N. Thompson*[B,C] *and D. J. Pannell*[A]

[A]Faculty of Natural and Agricultural Sciences, University of Western Australia, Crawley, WA 6009, Australia.
[B]Department of Agriculture and Food Western Australia, South Perth, WA 6151, Australia.
[C]Australian Cooperative Research Centre for Sheep Industry Innovation, Homestead Building, University of New England, Armidale, NSW 2351, Australia.
[D]Corresponding author. Email: Andrew.Kennedy@agric.wa.gov.au

SUMMARY

Ewe size at maturity affects whole-farm profitability. Firstly, because mature size is positively correlated with growth rate, selection for rapid growth results in a higher mature size. Secondly, larger ewes have higher maintenance requirements. Therefore, a trade-off exists between higher income from larger lambs and the cost of maintaining larger ewes. We hypothesize that whole-farm profit decreases as ewe mature size increases because of higher ewe maintenance costs.

To examine this trade-off, we constructed a whole-farm representation of a sheep enterprise in Hamilton, Victoria, using the 'AusFarm' simulation tool (Moore *et al*. 2007). The enterprise was simulated from 1965 to 2005 using historical weather information. The enterprise was 770 hectares in size and had 19 paddocks, three land classes that differed in soil type and slope and perennial ryegrass and subterranean clover pastures. The sheep system consisted of Merino ewes mated to Merino rams in mid-February for a mid-July lambing. Non-pregnant ewes were sold after pregnancy scanning and a proportion of ewe lambs were retained as replacements and mated at 7 months of age. Lambs were sold when they reached slaughter weight or were weaned and entered a feedlot if the specified weight was not achieved before the pasture quality declined. A full economic budget was calculated for each year.

We tested four stocking rates (8, 10, 12 and 14 ewes per hectare), four mature sizes (50, 60, 70 and 80 kg at condition score 3.0), three reproductive rates (100, 125 and 150 lambs per 100 ewes) and three lamb slaughter weights (45, 50 and 55 kg liveweight). Wool production was 5 kg greasy fleece weight, 20 microns fibre diameter and 70% yield. The highest profit ($885) was achieved with 14 ewes per ha, 60 kg mature size, 150% reproductive rate and a lamb slaughter weight of 50 kg. In general, profit was maximised when stocking rate was 12–14 ewes per ha, ewe mature size was 60–70 kg, reproductive rate was 125–150% and lambs were marketed at 45–50 kg liveweight (Table 1).

Table 1. Gross margins ($/ha), ewe supplement cost (ewe supp cost) and lamb finishing supplement cost (lamb finish cost) for various scenarios

Mature size (kg at CS 3)	Gross margin ($/ha)	Ewe supp cost ($/ha)	Lamb finish cost ($/ha)	Stocking rate (ewes per ha)				Reproduction rate (lambs per 100 ewes)			Lamb slaughter weight (kg liveweight)		
				8	10	12	14	100	125	150	45	50	55
50	543	73	143	391	497	594	689	488	558	582	603	531	494
60	686	93	48	518	642	765	820	616	704	739	685	699	675
70	702	111	13	567	700	799	787	621	712	752	680	708	721
80	683	160	10	613	694	767	661	598	694	713	650	691	707

The hypothesis was supported as profit decreased at a mature size of more than 70 kg because of a high ewe supplement cost. However, profit decreased at mature sizes of less than 60 kg because of high lamb supplement costs. The optimum mature size is 60–70 kg, at which ewe supplement costs and lamb finishing costs are balanced.

REFERENCE

Moore AD, Holzworth DP, Herrmann NI, Huth NI and Robertson MJ 2007. The Common Modelling Protocol: A hierarchical framework for simulation of agricultural and environmental systems. *Agricultural Systems* **95**, 37–48.