LEVELS OF POST- WEANING LOSS IN THE TRANGIE D-FLOCK (1975 -1983)

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SUMMARY

Survival of Merinos from weaning to 9 months of age was analysed in the multiple bloodline flock (D-Flock) maintained at Trangie between 1975 and 1983. Average post-weaning loss was 8.6%, but varied between years from 4.2% to 18.0%. Birth type, age of dam and sex had very small influences on the probability of survival post-weaning. Weight at weaning had a curvilinear relationship with weaner survival such that lighter animals had reduced survival while heavier animals showed little survival advantage over average weight animals. However, this relationship varied across years and was not a significant source of variation in several of the years observed.

INTRODUCTION

The average reproductive performance of Merino sheep in Australia is low by national and international standards. The overall reproductive rate (measured as lambs weaned per ewe joined) can be broken into its component traits of fertility, litter size and lamb survival. Lamb survival is generally limited to survival to weaning, but it can be extended to include post-weaning survival.

Sackett *et al.* (2006) estimated weaner mortality to cost about $89M annually while Lloyd, (Lloyd J unpublished) estimated an annual cost of $75M with an assumed 8% loss in sheep cereal and pastoral zones and a 10% loss in the high rainfall zone. Unpublished work from Angus Campbell of the Mackinnon Project estimated that reducing post-weaner mortality from 12% to 4% per annum would improve net farm profit by 80c/DSE across the whole farm.

Post weaning loss is not well enumerated and potentially represents a significant loss in genetic and financial terms. This study aimed to investigate the extent of post weaning losses and the extent to which factors such as weaning weight and age, birth type, sex and dam age influence weaner survival. The data spanned the period 1975-83 in a multiple bloodline Merino flock. Given the lack of attention that post-weaning survival has received in the past, it is highly likely there has been little change in the performance of Merinos since that time.

MATERIALS AND METHODS

Lambing and survival data for 14,187 animals was collected between 1975 and 1983 from the D-flock located at Trangie, NSW. The D-flock was based on fourteen bloodlines that were representative of the numerical importance of these Merino bloodlines within New South Wales at that time. A fifteenth flock, was similarly formed, and was drawn from the Fertility flock selection line which had been maintained at Trangie since 1959 (Atkins and Robards 1976).

The sheep grazed on largely natural grass pastures and some lucerne. Lambing occurred in July and lambs were weaned at an average age of 120 days (November). Lambs were weighed in May (approx 6 months post-weaning) to determine post-weaning growth and survival. A full description of the flocks and their management is provided by Mortimer and Atkins (1987).

Data were analysed in two stages with a generalized linear model using ASREML software (Butler *et al.* 2007). A logit transformation was used to account for the binary nature of survival. The initial model examined the survival variables lambs marked, lambs weaned and lambs surviving to the May weighing and included terms for birth year, sex, dam age, birth type and flock and any significant interactions. A further analysis of post-weaning survival included only year and flock with covariates for weaning age (linear) and weaning weight (linear and quadratic functions).

RESULTS AND DISCUSSION

What are the losses over time? Across all years, 21.6% of all lambs born died prior to lamb marking, an additional 5.9% died between lamb marking and weaning and 6.1% were lost post-weaning up to 9 months of age. Overall the average total loss was 33.6% between birth and 9 months of age (range 25-42% across years). While there was considerable variation between years, the pattern in the timing of losses across years was reasonably consistent.

The average losses post-weaning, expressed as a percentage of lambs weaned was 8.6%. This is considerably lower than the 12-14% post-weaning losses reported by Campbell and Behrendt (unpublished) in small scale research in Victoria (range 4.5-27.1%) and recent anecdotal reports from the Yass District in NSW indicating that producers were losing up to 25% of lambs post-weaning (R.P. Graham, 2005, pers. com.). The greatest loss in these data occurred in the 1975 birth cohort with 18% of animals dying between weaning and 9 months. Much of this loss occurred during a severe period of flystrike during early autumn (Atkins and McGuirk 1979). The range in losses in the other years was between 4% and 11% with an average of 7.5%.

Is there a difference between the survival of twins and singles? On average the pre-weaning survival rate of single born lambs was 79.8% compared to 66.8% for multiple births (Figure 1). Post-weaning survival, while not significantly different among birth types, reversed this trend. The survival of single males post-weaning was 90.2% compared with 92.4% for single females. For twins, the figures were 91.7% and 90.1% respectively, with a standard error of about 0.65% for each subclass. Only in the unusual year of the 1975 cohort, when overall losses were high, did the losses among multiples exceed that of singles. In that specific year, 12% of singles did not survive after weaning compared to 24% of twins.

a) b)

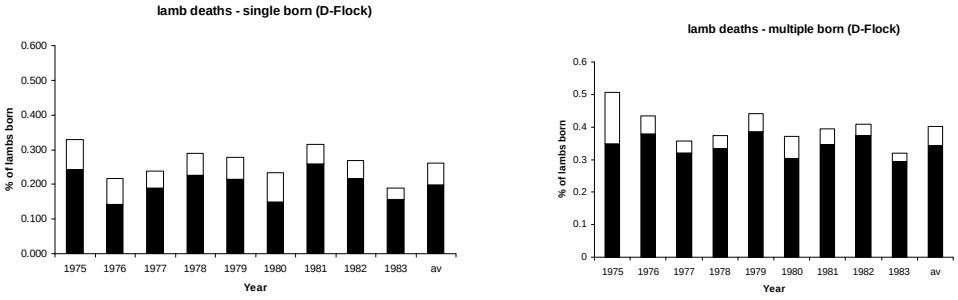

Figure 1. Effect of year on annual lamb and weaner deaths within (a) single and (b) multiple-born lambs. (The solid bars indicate lamb loss pre-weaning, the open bars indicate lambs lost between weaning and May (9 months of age) [predicted means from ASREML analysis?]

Effect of dam age: Pre-weaning survival was lower among progeny of 2-year old dams (69.8%) but little different among progeny of older age groups (73.0% to 74.2%). For post-weaning survival, the pattern with age of dam was somewhat different. The progeny of 2-4 year old dams had an average survival of 92.5% while for 5- and 6-year old dams, the survival rates were only 90.5% and 89.3% respectively. Standard errors for individual dam ages were less than 1%.

Effect of weaning age: Post-weaning survival improved with increasing weaning age. Over the range from 90 to 130 days, the corresponding survival rate increased from 89.4% to 94.5%.

Weaning weight: Figure 2 shows that weight at weaning has a curvilinear relationship with weaner survival such that lighter animals had a reduced survival. However, this relationship varied significantly across years and was not a significant source of variation in several of the years observed. During 1983, for example, the relationship was slightly inverted. The point of inflection for the other years varied over a range of about 12 kgs.

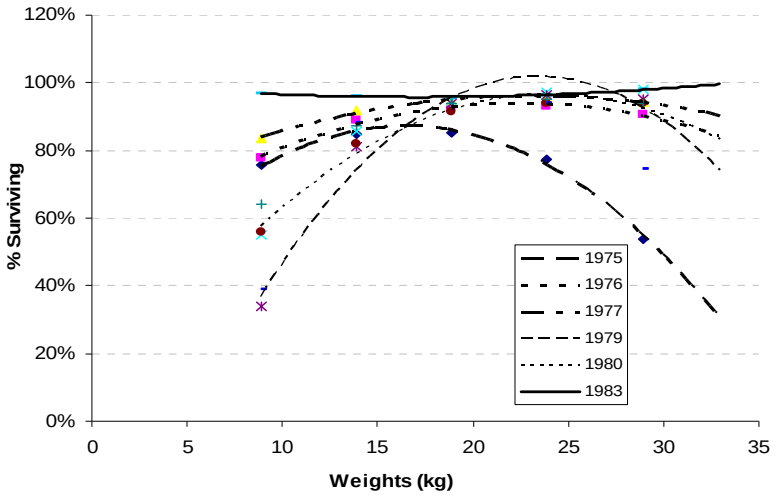

Figure 2. Relationship between weaning weight and postweaning survival, predicted from the weaning weight X year interaction

Weaning weight and flock interactions. Table 1 shows post-weaning survival at different weaning weights for each of the sub-flocks contributing to the D-Flock. The lighter lambs were less likely to survive. However the number sampled at the lower end of the distribution is small (7% vary from the mean by -10kgs or more, 0.2.% vary by +15kgs or more). The mean weight of the bottom 20% of the population was 14.1 kgs with a survival of 77.7% (20% of lambs were less than 16kg). The mean weaning weight of the heaviest 80% was 18.9 $\pm$1.2 kgs with a survival of 92.6%.

One recommendation to improve post-weaner survival is to draft off the lightweight animals at weaning and to provide them with differential feeding and management. The data presented here suggests that such a practice is targeting a small number of animals, not all of which can be expected to respond to nutritional stimuli.

IMPLICATIONS

This analysis of the D-Flock data from Trangie has shown that information relating to post-weaning survival in one region will not necessarily apply elsewhere. This analysis has found:

- **Birth type** had a very small influence on the probability of survival post-weaning.
- **Age of dam** had a very small influence on the probability of survival post-weaning.
- **Sex** had a very small influence on the probability of survival post-weaning.

- **Weight at weaning** had a curvilinear relationship with weaner survival such that lighter animals had a reduced survival. However, this relationship varied significantly across years and was not a significant source of variation in several of the years observed.
- **Economically** focussing on increasing the weight of the lightest 20% of animals is unlikely to be a very cost-effective strategy to increase sheep numbers in the Trangie environment reported here. More analyses from other environments need to be undertaken before global strategies are developed.

Table 1. The effect of weaning weight on weaner survival (%) within each of 15 bloodlines across years

				Weight (kg)				
Flock	Description	mean	n	10	15	20	25	30
36	Fine wool Saxon	16.5	374	84	91	96	99	100
38	Fine wool Saxon	16.1	270	76	87	96	103	107
45	Medium wool Peppin	20.3	1499	86	92	95	96	95
33	Medium wool Peppin	19.1	595	81	89	95	98	100
32	Medium wool Peppin	18.2	672	83	92	98	102	104
34	Medium wool Peppin	18.7	672	85	92	97	100	100
41	Medium wool Peppin	18.1	499	72	81	88	93	95
39	Medium wool Peppin	17.9	498	86	92	96	97	97
43	Medium wool Peppin	19.5	532	81	89	95	99	100
44	Medium wool Peppin	18.8	570	84	90	94	95	94
42	Medium wool Peppin	17.9	583	86	92	96	98	98
37	Medium wool Peppin	18.7	416	79	86	92	95	96
31	Medium wool non-Peppin	19.3	710	86	92	96	97	96
35	Medium wool non-Peppin	18.8	624	80	89	96	101	104
40	Strong wool South Australian	19.8	470	80	88	93	96	97
	Whole Flock	18.8		80	90	95	98	97
	Standard errors			1%	.4%	.4%	.6%	.1.3%

ACKNOWLEDGEMENTS

The authors would like to acknowledge the support of the Sheep CRC and the many DPI staff who have been involved in data collection at Trangie ARC.

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