

THE EFFECT OF INCLEMENT WEATHER ON MORTALITY OF MERINO AND CORRIEDALE LAMBS ON KANGAROO ISLAND

J. M. OBST* and H. R. DAY†

Summary

Climatic data and lambing results collected from Merino and Corriedale flocks on Kangaroo Island, during the years 1959 to 1963 inclusive, are reported.

Winds greater than 8 kph (5 mph) with rainfalls of 0.25 to 5.0 mm/day (0.01-0.2 in.), significantly increased mortality of Merino ($P < 0.01$) and Corriedales lambs ($P < 0.05$) above the 15.1% (Merinos) and 16.4% (Corriedales) recorded with no wind or rain.

The highest mortality in the Corriedales, 53.7%) and in the Merinos, 91.1% , occurred in winds of 24-56 kph (15-35 mph) with rainfalls of 5.3-26.0 mm/day. The survival rate of Merino lambs was also lower than the Corriedales in winds above 8 kph without rain.

I. INTRODUCTION

Estimations by Alexander (1962) of the climatic limitations on homeothermy in lambs based on summit metabolism, measured over a 20 minute period, indicated that hypothermia would be expected in a proportion of new born lambs in winds of 19.8 kph, if the ambient temperature were to fall below 23°C.

The daily mean ambient temperature during lambing on Kangaroo Island ranges from 8.6°C to 12.3°C (47-54°F) and wind speeds greater than 19.8 kph (12 mph) are frequently experienced.

Mean lamb losses of 25% (range 14 to 32%) and 29% (range 24 to **40%**) in Corriedale and Merino flocks respectively, have been recorded over a five year period on the Department of Agriculture Research station on Kangaroo Island, South Australia. This paper reports some of the findings from the analysis of lamb and climatic data collected during the years 1959 to 1963 inclusive, in a preliminary attempt to determine the causes of this high mortality.

II. MATERIALS AND METHODS

Flocks of 200 to 300 South Australian Merino ewes and 200 to 300 Corriedale ewes of the same age structure, two to five years old, were set-stocked at 10 ewes/ha (4/ac) in 10 ha (25 ac) paddocks for lambing during July and August in 1959 to 1962, and in June and July in 1963. The yearly management of both breeds was identical.

Natural vegetation bordered the lambing paddocks on the southern and/or western sides. This vegetation consisted of stunted (mean height 4 m) *Eucalyptus cosmophylla* and *Eucalyptus baxteri* with dense dry sclerophyllous undergrowth.

Ewes and lambs were inspected at 0800 and 1600 h daily. The ewes did not appear to be disturbed by the presence of men or vehicles. Each lamb was easily

*Department of Agriculture, Research Station Kangaroo Island, South Australia.

†Department of Agriculture, Research Station Turretfield, South Australia.

identified with its mother (error of approximately 2-5% for foster mothering) and was tagged and weighed within 24 h of birth. The date of death of each lamb was recorded. Tails were removed and male lambs castrated at an average age of 15 days (range 5-30 days).

Daily mortalities were expressed as $\frac{(100 \text{ } d_t)}{b_t} \%$, where:—

d_t = the total number of lamb deaths, of any age from birth to marking, during the 24 h period from '1700 h on day t_{-1} to 1700 h on day t .

b_t = the total number of lambs born (dead or alive) from 1700 h on day t_{-1} to 1700 h on day t .

The climatic data were recorded at the official Bureau of Meteorology station situated up to 1 km from the lambing paddocks. Maximum, minimum, wet and dry bulb temperatures, rainfall and wind were recorded at 0900 and 1500 h daily.

For the purpose of analyses relating daily lamb mortalities to climatic conditions, the rainfall was taken to be the amount during the period from 1500 h on day t_{-1} to 1500 h on day t . The wind force (Beaufort scale) at 0900 h on day t was taken as relating to the period from 1700 h on day t_{-1} to 1700 h on day t .

III. RESULTS

3,077 lambs were born over the five year period; 813 died from birth to marking and 82% of these died from birth to three days of age.

The mortalities of Corriedale and Merino lambs at varying combinations of wind and rain are presented in Table 1 and Figure 1.

Rainfalls above 5.0 mm/day varied from 10.2 mm/day at winds of 0-3 kph, to a maximum of 26 mm/day at winds of 24 to 56 kph.

The increase in mortality of Corriedale and Merino lambs when rainfall increased from 0 to more than 5.0 mm/day with no wind was not significant ($P>0.05$). Corriedale lambs were not significantly affected ($P>0.05$) by wind without rain.

Highest mortalities occurred with winds of 24-56 kph accompanied by rainfalls of more than 5.0 mm/day. Under these conditions, the mortality of Corriedales increased by 25.8% ($P<0.001$) and the Merinos by 52.8% ($P<0.001$) above the mortalities in rainfalls of 0.25-5.0 mm/day with winds of 24-56 kph. The difference (37.4%) between the Corriedale and Merino lamb mortality at the highest winds and rainfalls was highly significant ($P<0.001$).

IV. DISCUSSION

The results suggest that lamb losses on the Kangaroo Island Research Centre are associated with the weather during the lambing period. Unfavourable weather was also a cause of lamb mortality in a flock of Corriedales in Victoria (Alexander, Peterson and Watson 1959).

Differences in mortality between Merinos and Corriedales, especially in conditions of wind with no rainfall, and high winds with high rainfalls, cannot be attributed to differences between breeds in the proportion of single and multiple births. In conditions of wind without rain twin births expressed as a percentage of all births varied from 50% to 55 %; at the highest winds and rainfall, the percentage born as twins was 42% in the Merinos and 35 % in the Corriedales. It is also

TABLE I
Mortality of Merino and Corriedale Lambs in varying conditions of wind and rainfall
(Number of lambs born in parentheses)

BREED	WIND† (kph)	RAINFALL (mm/24 hours)								
		0			0.25-5.00			>5.00		
		Difference‡			Difference‡			Difference‡		
		Mortality %	Chi-Square	P	Mortality %	Chi-Square	P	Mortality %	Chi-Square	P
MERINO	0-3	15.1 (199)			20.5 (299)	2.29	n.s.	26.4 (14)	0.62	n.s.
	8-16	25.9 (232)	8.13	**	25.8 (426)	9.51	**	43.1 (65)	23.56	***
	24-56	28.5 (137)	9.15	**	38.3 (256)	29.86	***	91.1 (56)	114.45	***
CORRIEDALE	0-3	16.4 (213)			17.6 (182)		n.s.	33.3 (6)	1.23	n.s.
	8-16	16.4 (152)		n.s.	25.4 (355)	6.30	*	38.5 (91)	17.33	***
	24-56	22.5 (120)	2.16	n.s.	27.9 (179)	7.32	**	53.7 (95)	43.31	***

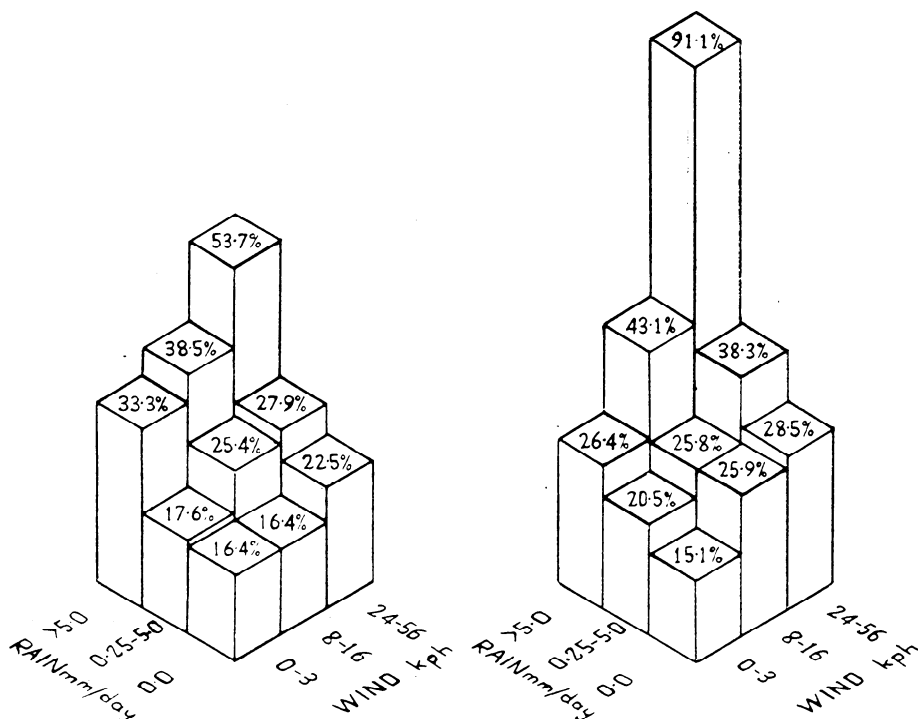
†Wind in kph equivalents of the Beaufort Scale.

‡All significant differences are related to two "base levels" of mortality; 15.1% and 16.4% for Merino and Corriedales respectively. These are the (100d_t)

mortality rates — % when no rain and no wind.

(b_t)

Chi-square values: * >3.84 ($P < 0.05$); ** >6.64 ($P < 0.01$); *** >10.83 ($P < 0.001$).



CORRIEDALES MERINOS

Fig. 1.—Mortality of Corriedale and Merino lambs in varying conditions of wind and rain.

Mortality is expressed as $\frac{(100 \text{ } d_t)}{(b_t)}$ percent.

Where: d_t = the total number of lamb deaths, at any age from birth to marking, during the period from 1700 h on day $t-1$ to 1700 h on day t .

b_t = the total number of lambs born (dead or alive) in the same period.

unlikely that the difference (0.3 kg) in mean birth weight between Merino lambs (3.2 kg) and Corriedale lambs (3.5 kg) would account for the differences in mortality.

Alexander (1962) indicated that lambs with a hairy birth coat would be more likely to survive than lambs with a fine birth coat in environments causing a high rate of heat loss. In the present study the coats of the lambs were not examined at birth, but at marking there was similarity between breeds in the proportions of fine and hairy coated lambs.

Irrespective of differences between the two breeds, the necessity of providing shelter, from wind and rain, to new born lambs of either breed is apparent.

V. ACKNOWLEDGMENTS

The authors wish to thank Mr. J. V. Ellis for advice on statistical presentation.

VI. REFERENCES

- ALEXANDER, G. (1962). *Aust. J. agric. Res.* 13: 100.
 ALEXANDER, G., PETERSON, J. E., and WATSON, R. H. (1959). *Aust. vet. J.* 35: 433.