THE EFFECT UPON NEONATAL LAMB MORTALITY OF LAMBING SYSTEMS INCORPORATING THE USE OF PARTIAL AND COMPLETE SHELTER

J. W. McLAUGHLIN*†, J. K. EGAN*, W. McL. POYNTON*
and R. L. THOMPSON*

Summary

The survival of new born lambs in south-western Victoria was compared in three lambing systems, namely (i) exposed paddocks (ii) strategic confinement to areas of known shelter (iii) individual pen lambing in a shed. In the first year, systems (ii) and (iii) increased the survival of single and twin lambs in the period between birth and 48 h of age. In the second year, system (iii) increased the survival of single lambs, but no other differences were significant.

It is concluded that system (ii) offers an alternative to individual pen lambing as a method of improving lamb survial, but that results of any intensive lambing systems are likely to vary between years.

I. INTRODUCTION

Autumn mating of ewes in western Victoria usually results in an increased proportion of twin births (Radford 1959; McLaughlin 1968). However, the inclement weather often encountered in this area during August and September can cause death in a high proportion of lambs, particularly amongst those of multiple births.

Alexander, Peterson and Watson (1959) and Watson ***et al.*** (1968) have demonstrated that losses in the neonatal period can be minimized by the provision of shelter and food.

This paper describes observations on the influence upon the survival of newly born lambs of the controlled use of field shelter, and of individual pen lambing in a shed. .

II. MATERIALS AND METHODS

(a) Location and Animals

The observations were made on three to six-year old Corriedale ewes at Hamilton in south western Victoria. The ewes were joined to Corriedale rams in

* Department of Agriculture, Pastoral Research Station, Hamilton, Victoria.
† Present address — School of Agriculture, University of Melbourne.

April 1967 and March 1969 and were run as one flock and weighed regularly from mating to lambing.

Mating was recorded daily in 1967 and weekly in 1969 (Radford, Watson and Wood 1960), for two and three weeks respectively after the introduction of the rams. Ewes not returning to service were allocated to three groups according to mating date, age and liveweight one month before the start of lambing.

(b) Treatment of Groups

Immediately before the start of lambing, the ewes were separated in to (i) exposed, (ii) shelter and (iii) shed groups. The groups were then introduced to the lambing systems in weekly drafts of ewes 142 to 149 days after mating.

Observations were made from August 3 1 to September 20, 1967 and from July 29 to August 22, 1969.

(i) Exposed Group

The group was rotated through four paddocks each of 2.5 ha of level land exposed to the weather from all directions. When lambs were three to four days old, they and their dams were moved to a larger depot paddock. No attempt was made to save lambs.

(ii) Sheltered Group

During daylight, except in periods of wet and windy weather, the ewes were run in two paddocks, each of approximately 1.5 ha surrounded by cyprus (*Cupressus macrocarpa*) hedges 5-8 m high (Figure 1). A series of yards, each approximately 10 x 20 m, was built against the hedges from prefabricated wire fencing.

Each night, and during periods of inclement weather, the unlambed ewes and ewes with new born lambs were moved into the yards that provided greatest shelter from the weather, with a maximum of 20 ewes/yard. The following morning, the unlambed ewes were released from the yards to the remainder of the paddock.

Ewes with lambs were kept in the yards until the lambs were three to four days old and judged sufficiently strong to be allowed into a less sheltered paddock. A few lambs were warmed and assisted to suck where necessary.

Ample pasture was available in both the paddocks and the yards and no supplement was offered to the ewes.

(iii) Shed Group

Although a different lambing shed was used in each of the two years, the arrangement of pens and surrounding paddocks was very similar. During the day, the unlambed ewes were grazed in a small paddock of approximately 1 ha (1969-2 ha) adjacent to a lambing shed containing 30 wire mesh! pens measuring 1.3 x 1.3 m.

In 1967, all unlambed ewes over 148 days pregnant were placed in individual pens in the shed overnight, and those which had not lambed were released on the following morning.

In 1969, the ewes admitted to the shed were selected each afternoon according to their udder development and the colour and degree of relaxation of the vulva.

Ewes with twins or weak singles born during the day were placed in the shed overnight. During periods of wet and windy weather, ewes with lambs born

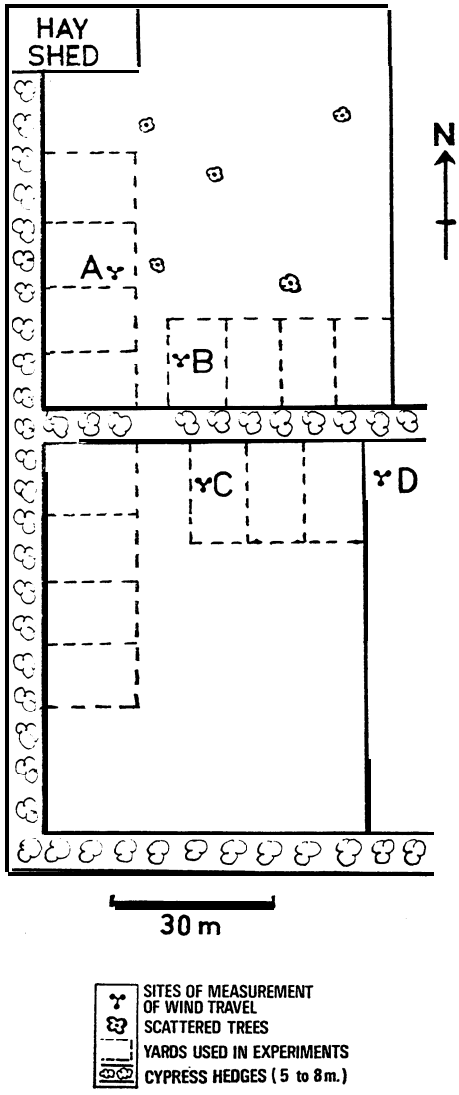

Fig. 1. — Plan of sheltered experimental paddocks.

during the day were transferred to the shed as soon as possible after birth.

Each morning, ewes with single lambs were moved to a depot paddock with limited shelter. Ewes with twins were moved to a nearby paddock with good shelter, provided the weather was mild and the lambs well mothered and strong. Otherwise they remained in the shed until the lambs were considered strong enough to be released. Thereafter, they were closely supervised for the next week before release to the depot paddock containing the ewes with single lambs.

Any weak lambs were warmed and assisted to suck if necessary. Inspections of unlambed ewes and ewes with new born lambs were conducted at least 4 h between 0800 and 2200 h.

(c) Observations During Lambing

At each inspection, new born lambs were identified and weighed. All dead lambs were autopsied. Continuous observations were made on wind velocity and direction, rainfall, sunshine and temperature at a site in the exposed paddocks. Daily wind travel was recorded at various sites in the shelter system (Figure 1).

III. RESULTS

(a) Weather

In both years, the weather during the observations varied from fine and sunny to wet, cold and windy (Table 1). Rain fell on 13 of 21 days in 1967, and on 13 of 24 days in 1969.

Average wind velocity at various sites in the sheltered area (Figure 1) varied from 28 to 40 per cent and from 21 to 44 per cent of the average velocity in the exposed area for 1967 and 1969 respectively.

(b) Lambing

Amongst the shed group in 1967, 36 single bearing and 18 twin bearing ewes lambed in the shed, whilst 48 and 17 ewes respectively lambed outside. In

TABLE 1

Weather conditions during observations in 1967 and 1969*

Attribute	Year 1967	1969
Rainfall (mm/day)		
Range of falls	0.3, 4.3	0.3, 14.0
Total	27	50
Sunshine (h/day)		
Range	0.0, 10.0	0.0, 8.0
Mean	4.5	3.8
Temperature °C (daily minimum)		
Range	0.9, 8.8	—0.2, 10.7
Mean	4.3	7.3
Temperature °C (daily maximum)		
Range	7.4 18.8	9.7, 16.9
Mean	13.6	14.4
Average Wind Speed km/h (24 h)		
Exposed site†		
Range	3.4, 17.5	1.4, 16.4
Mean	10.4	8.5
Sheltered Site‡, §		
Measurement site A	4.0	3.4
B	2.9	3.4
C	4.2	1.8
D	4.0	3.7

* Taken at exposed site only, except wind speed in sheltered site.
† Woeffle Anemometer, cup height = 0.6 m.
‡ Figure 1.
§ Munro Cup Anemometer, cup height = 0.6 m.

1969, 43 single bearing and 14 twin bearing ewes lambed inside, and 42 and 17 ewes respectively lambed outside.

There was no significant difference between groups in the birthweight of lambs of single or multiple births in either year.

The overall proportion of ewes giving birth to twin lambs in 1967 was significantly greater ($P < 0.05$) than in 1969 (Table 2).

(c) Deaths

The number of lambs born dead or dying during the birth process was small and similar in each group (Table 2). The number dying from 48 h to marking was similar in the different groups, but was consistently greater in 1967 than in 1969. This was in part a reflection of the condition of the ewes in 1967, a year of severe drought.

Mortality amongst single born lambs from birth to 48 h in 1967 was greater in the exposed group (14 per cent) than in the shelter (4 per cent) or shed groups (5 per cent) ($P < 0.05$ for both groups). There were fewer deaths among the single lambs in the shed groups (0 per cent) in 1969 than in the exposed group (13 per cent) ($P < 0.01$).

In 1967, considerably fewer twin lambs died between birth and 48 h in both the shed (9 per cent) and shelter groups (9 per cent) than in the exposed group (28 per cent) ($P < 0.01$ for both groups). In 1969, the increased survival of twins in the shed and shelter groups was not significant (Table 2). Of the eight twin lambs that died from birth to 48 h in the shelter group, two showed gross infection of the liver and umbilical cord. A further two apparently died from starvation and, in one case, the ewe was in very poor condition with very little milk and died within five days of the birth of her lambs. The mother of one of a pair of twins, which died after 36 h, had only one functional teat.

IV. DISCUSSION

The present observations suggest that a significant improvement in the survival of new born lambs may be obtained by individual pen lambing in a shed during periods of weather rather milder than those described by Watson et *al.* (1968).

The confinement of ewes and new born lambs to areas of known shelter in the field offers a useful alternative to a shed lambing system. Caborn (1957) showed that maximum shelter from a permeable windbreak occurs at a distance to leeward of about five times the height (ht) of the shelter and that a useful reduction in wind velocity occurs up to 10 ht. The yards and sites of measurement of wind travel in the observations described were all within 5 ht of the hedges used. The average wind speed measured at sites close to the hedges was always less than 44 per cent of that in the exposed paddocks.

Provided that this order of reduction is achieved at all wind speeds normally experienced, then the average wind speed over 24 h within the sheltered area should rarely have exceeded 8 km/h, the critical wind velocity contributing to lamb deaths (Obst and Day 1968).

Previous observations conducted in the same paddock as the present experiments (McLaughlin, unpublished data) have indicated that the provision of

TABLE 2

Lambs born, mean birth weights and lamb mortality in relation to birth type and age at death

Year	Group	Type of Birth	Number of Lambs Born	Mean (±S.E.) Birthweight (kg)	Distribution of Deaths according to Age at Death		
					Stillborn and Parturient deaths	Birth to 48 h	After 48 h *
1967	Exposed	Single	88	4.28 ± 0.08	3	12	3
		Twin	60	3.45 ± 0.06	—	17	9
	Shelter	Single	81	4.45 ± 0.09	1	3	7
		Twin	78	3.25 ± 0.08	1	7	10
	Shed	Single	84	4.46 ± 0.08	1	4	2
		Twin	70	3.36 ± 0.07	—	6	14
1969	Exposed	Single	106	4.34 ± 0.07	–	14	4
		Twin	42	3.45 ± 0.12	—	9	3
	Shelter	Single	94	4.33 ± 0.08	1	9	2
		Twin	50	3.51 ± 0.12	2	8	2
	Shed	Single	85	4.13 ± 0.13	1	—	4
		Twin	62	3.27 ± 0.09	3	7	3

* Up to three weeks average age.

shelter may have little effect on lamb survival unless the ewes are confined to the known sheltered areas.

It is likely that the reduction of lamb losses by lambing in systems incorporating partial or complete shelter will vary between years depending mainly on weather conditions and the incidence of twinning in the flock. The strategic and controlled use of field shelter still requires testing under severe weather conditions.

It is not possible from these results to determine the relative contributions to increased lamb survival of the shelter provided and the control of ewes in individual pens or in small flocks. The results of Beggs and Campion (1966) suggest that the control of ewes during autumn lambing can improve survival. However, the provision of shelter as such appears to be important with spring lambing in Victoria, as Watson et al. (1968) found a great improvement in the survival of lambs born in a shed during limited periods of very severe weather and little effect in more normal weather.

V. ACKNOWLEDGMENT

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VI. REFERENCES

ALEXANDER, G., PETERSON, J. E., and WATSON, R. H. (1959). Aust. vet. *J.* **35:** 433.

BEGGS, A. R., and CAMPION, E. J. (1966). *Proc. Aust. Soc. Anim. Prod. 6:* 169.

CABORN, J. M. (1957). Shelterbelts and microclimate. H. M. Stationery Office. Forestry Office. Forestry Commission Bulletin No. 29.

MCLAUGHLIN, J. W. (1968). *Proc. Aust. Soc. Anim. Prod.* **7:** *223.*

OBST, J. M., and DAY, H. R. *(1968). Proc. Aust. Soc. Anim. Prod. 7: 239.*

RADFORD, H. M. (1959). *Aust. J. agric. Res.* 10: 377

RADFORD, H. M., WATSON, R. H., and WOOD, G. F. (1960). *Aust. vet. J. 36: 57.*

WATSON, R. H., ALEXANDER, G., CUMMING, I. A., MACDONALD, J. W., MCLAUGHLIN, J. W. RIZZOLI, D. J., and WILLIAMS, D. (1968). *Proc. Aust. Soc. Anim. Prod. 7: 243.*