THE EFFECT OF STOCKING INTENSITY AT LAMBING ON LAMB SURVIVAL AND EWE AND LAMB BEHAVIOUR

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Summary
Continuous behaviour observations were made on 232 mature Corriedale ewes which were stocked at 14.3 ewes/ha and 143 ewes/ha during a lambing period of one week. At the higher stocking intensity, there were more new-born lambs separated from their dams following interference by alien ewes. There were no differences between treatments in total numbers of lamb deaths.

I. INTRODUCTION
It is likely that there will be an increase in the use of intensive lambing systems to increase lamb survival in Southern Victoria. Such techniques as drift lambing and the confinement of lambing ewes in sheltered areas lead to an increase in the stocking intensity. Observations made by Watson et at. (1968) suggest that the incidence of behaviour detrimental to lamb progress and survival may become more important under more intensive conditions.

The observations reported here were carried out to investigate the effect of stocking intensity upon ewe and lamb behaviour at parturition, and upon lamb survival to approximately two weeks of age.

II. MATERIALS AND METHODS
(a) Animals and Management
The oestrous cycles of three hundred 4 and 5 year old Corriedale ewes were synchronised, and 232 ewes pregnant to matings with. Dorset Horn rams within a seven-day period were selected for the experiment. The ewes maintained a steady liveweight increase during pregnancy. At lambing, they had ten months wool growth and were not wigged or crutched.

One day prior to the commencement of the observations, equal numbers of ewes were allocated at random within age groups to either treatment 1 or treatment 2, and were placed in the observation paddocks after identification saddles had been provided for each ewe.

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(b) Treatments
The observations were made in an exposed field 10.52 ha (26 ac) in area. Ewes on treatment 2 were placed in one of three small adjacent paddocks, each 0.81 ha (2 ac) in area, which were fenced off in one corner of the field to give a stocking intensity of 143 ewes/ha (58 ewes/ac). The three paddocks were used once each during lambing to provide sufficient feed. Ewes on treatment 1 lambed in the remaining 8.09 ha (20 ac) paddock to give a stocking intensity of 14.3 ewes/ha (5.8 ewes/ac). Immediately after the completion of continuous observations, treatment two ewes grazed their three paddocks as a whole for four days, and then joined the treatment 1 ewes on the whole field until the completion of the experiment.

(c) Identification
Each ewe was identified by a numbered saddle constructed of two pieces of black calico (30 cm x 15 cm) one on either side and joined by tapes around the ewe. Numbers about 10 cm high were painted on each piece in white reflective liquid. At about 2 h of age, each lamb was weighed and identified with its dam’s number which was sprayed on the lamb’s side from a blue (singles) or red (twins) aerosol pack.

(d) Observations
A 9 m high observation tower supporting a canvas hide was situated approximately at the centre of the field, and ewe and lamb behaviour was continuously observed from this hide during lambing from August 20 to 27, 1969. Binoculars (7 x 50) were used both night and day, and illumination at night was provided by a 48 W car spotlight which powered by a portable 1 kW generator. Particular attention was paid to parturition and to the ewe and lamb during the subsequent 2 h period. Data from the parturitions of 41 ewes which did not lamb during the continuous observations have been excluded. Dead lambs were collected each day for autopsy. On September 1, an assessment was made (principally by remote observation with the aid of binoculars) of which ewe was suckling each lamb. On September 10, all surviving lambs were weighed and the udder of each ewe inspected.
Continuous weather records were made on the site. The weather during lambing was settled and fine except for the last day. Days were warm, but nights were clear and still and ground frost was present on five occasions. Wind velocity was very low in this period. The weather became wet and unsettled on the last day of lambing and generally cool, shower-y and sometimes windy weather persisted until the experiment was completed.

(e) Observer Interference
Interference by observers was kept to a minimum. At lambing, ewes were only assisted if the lamb had been seen to be presented for more than 2 h.
Animals on treatment 2 were moved twice, and each time they were allowed up to 4 h to move on to the next paddock without interference, after which the remaining ewes and lambs in small groups were moved slowly during a period of 2 h.

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Spraymark: Hortico Ltd.
Statistical Procedures

Lamb weights were compared by analysis of variance, and other data were compared by $\chi^2$ analysis.

III. RESULTS

(a) The Distribution of Births and Deaths

Births appeared to follow the distribution expected from a two to three day mating period (Figure 1), and there was little evidence of a difference between treatment groups in the distribution of twin and single births. The number of dead lambs collected each day increased slowly during the observation period until the weather changed and a peak of 28 lambs died on August 27.

(b) Cause of Death

There was a high level of lamb loss, 28 per cent of 90 single lambs and 34 per cent of 188 twin lambs dying before September 10. Dystocia and infection were the primary causes of only 8 deaths (treatment 1 to 5; treatment 2 to 3). On treatment 1, twelve deaths could have involved udder defects (such as poor development, mastitis and blind teats) and, of those where udder defects were not involved, 8 lambs obtained milk and 26 did not, giving a treatment total of 51 deaths. The corresponding numbers of deaths on treatment 2 were not significantly

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Fig. 1. — Number of lambs born per day, including lambs separated from their dams with alien ewe interference. 1 = treatment 1 (14.3 ewes/ha), 2 = treatment 2 (143 ewes/ha).
different (9, 9, 26 and 47). The total numbers of lambs which survived till September 10 on each treatment were not significantly different (treatment 1 to 92; treatment 2 to 93).

(c) Behaviour Observations

On the basis of behaviour, each lamb was classed into one of three classes (Table 1).

(i) Deserted Lambs

These lambs became permanently separated from their dams without any observed interference by alien ewes, and subsequently died.

(ii) Lambs Separated from their Dam with an Alien Ewe Interfering

This category includes lambs which (a) were seen to become separated from their dam while an alien ewe was interfering, and subsequently either died or were seen being suckled by alien ewe, or (b) were not seen to become separated within 2 h of birth, but were being suckled by an alien ewe on September 1.

Figure 1 shows that the incidence of this occurrence in relation to the total number of births each day is consistently higher in treatment 2.

(iii) Lambs Reared by their Dam

Lambs in this class were not seen to become separated from their dams and, on September 1, were being suckled by their own dams. There was little difference between treatment groups in the number of lambs in this class. In treatment 1, there were 27 single lambs, 16 twins reared as singles and 34 twins reared as twins. Corresponding numbers in treatment 2 were 27, 18 and 30.

(d) Lamb Birthweights and 18-day Liveweights

Average birthweights for singles and twins were 4.15 ±0.06 kg and 3.54±0.05 kg respectively.

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<tr>
<th>Classification of lamb births and the number of lambs which survived</th>
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<td>Treatment 1</td>
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<td>(14.3 ewes/ha)</td>
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<td>Total no. of lambs born</td>
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<td>No. of deserted lambs (died)</td>
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<td>No. of deserted lambs deserted before 2 h of age</td>
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<td>No. of lambs separated with alien ewe interfering</td>
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<td>(i) those which survived</td>
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<td>(ii) those separated &lt;2 h of age</td>
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<td>(iii) those of (ii) surviving</td>
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<td>Total no. of lambs separated from their dams</td>
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<td>No. of lambs reared by their dams</td>
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<td>Total No. of lambs interfered with by alien ewes</td>
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<td>No. of these which survived</td>
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<td>Total No. of lambs surviving to September 1</td>
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* Difference between treatments 1 and 2 significant P<0.05; all other differences not significant of 5% level.
A comparison was made of pooled birthweights and pooled 18 day live-weights between lambs which were suckled by their own dams and lambs which were suckled by alien dams. The average birthweights of separated and non separated lambs were: 4.13 and 4.13 kg (SE ±0.45 kg, N.S.D.) for singles and 3.31 and 3.60 kg (SE ±0.14 kg, P<0.05) for twins respectively.

The mean 18 day liveweights of separated and non separated lambs were: singles 7.08 and 8.49 kg (SE ±0.55 kg, P<0.01) and twins 6.54 and 7.33 kg (SE ±0.49 kg, P<0.05) respectively. Five of 12 separated singles were being suckled as twins compared with 2 of 54 non separated singles (2 single bearing ewes adopting alien lambs). In contrast, similar proportions of separated and non separated twin lambs (17/27; 64/98 respectively) were suckled as twin lambs.

IV. DISCUSSION

In general, ewes lambed under ideal spring weather conditions. However, poor weather at the end of lambing probably contributed to the death of poorly mothered lambs. Many lambs died with no sign of milk in the alimentary tract at autopsy, suggesting that poor maternal behaviour and inadequate lamb vigour were important causes of loss.

The stocking intensity of ewes during lambing was constant, but the rate of lambing rose to a peak due to synchronization. It is possible that there is an interaction between these two variables in the incidence of interference. It appeared that the incidence of interference was related primarily to the distribution of parturitions in both treatments.

The higher levels of both desertion and interference observed with lambs less than 2 h of age in treatment 2 indicates that the higher stocking intensity facilitated the separation of ewes and their lambs soon after birth. The total numbers of lambs separated from their dams (desertions + separations involving interference) were not significantly different, but the higher level of desertion on treatment 1 and the higher level of separation involving interference on treatment 2 suggest that the higher stocking intensity facilitated contact between poorly mothered lambs and alien ewes interested in mothering lambs.

It is unlikely that the results were influenced differentially by the presence of observers amongst the animals since this was infrequent and was not followed by any pronounced increase of alien ewe interference or desertion.

There were trends for more lambs to die as a result of desertion on treatment 1, but for more lambs to die following separation involving interference on treatment 2. The total numbers of these deaths were very similar in each treatment. There was no treatment effect on overall lamb survival.

The lambs reared by alien ewes did not grow as fast as those reared by their own dams, possibly due to some delay in being adopted by alien dams or, as in the case of some separated single lambs, through being reared as twin lambs.

The survival rate of all lambs interfered with by alien ewes was high but, under less favourable weather conditions, the level of interference may be more critical.
V. ACKNOWLEDGMENTS

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VI. REFERENCES