INTERRELATIONSHIPS BETWEEN THE DURATION OF PARTURITION, POST-NATAL BEHAVIOUR OF EWES AND LAMBS AND THE INCIDENCE OF NEONATAL MORTALITY

LYN SHELLEY*

Summary
In a flock of Merino ewes lambing whilst confined at a high stocking intensity, 21 per cent of total lamb deaths were attributed to aspects of the behaviour of ewes. There were minor differences between young ewes and older ewes in maternal behaviour. Labour time and the distribution of this parameter was not different between young and older ewes. There was a strong association between two aspects of ewe behaviour, namely, time taken to rise after lambing and desertion of lambs, and prolonged labour time. Thus, prolonged labour reduced mothering ability.

I. INTRODUCTION
Deficiencies in maternal behaviour contribute to deaths of newborn lambs (Moule 1954; McHugh and Edwards 1958), particularly in flocks lambing for the first time (Alexander and Peterson 1961). Alexander (1960) and Wallace (1948) concluded that long labour and consequent fatigue reduced mothering ability.

Since any aspect of ewe behaviour detrimental to lamb survival is of practical importance, patterns of behaviour of maiden and older Merino ewes lambing in August in the Western District of Victoria were examined in relation to the incidence of lamb mortality.

II. MATERIALS AND METHODS
(a) Animals
The study was made on a flock of 235 Merino ewes aged two, three and four years, with approximately equal numbers of each age. The ewes were mated in March and were due to lamb over a period of 14 days in August.

(b) Management
The ewes were stocked at the rate of 250 per ha in a paddock illuminated at night. An observer was present for the whole-period of the experiment and the recordings made included length of labour and times of various stages of progress towards sucking until the lamb obtained its first drink. Any forms of misbehaviour by the ewe impeding the successful sucking by the lamb, including the incidence of prelambing interest in other lambs, were listed.

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Deaths of lambs were classified according to the chief factor implicated in the failure of mothering and feeding of the lamb; more than one factor was often involved. Maternal behaviour was considered not to operate before the lamb had stood and sought milk. Subsequent failure was attributed to the lamb or the ewe on the subjective assessment of the factor of major importance. It was considered that losses due to weather were associated primarily with the inability of the lamb to adapt to the environmental conditions. Although ewe behaviour might be affected by adverse weather, any effect was considered to be secondary to the effect on the lambs. Weather factors were also strongly superimposed on mortalities in the “sucked but died” category.

No assistance was given at lambing unless a ewe had failed to lamb within two hours of the commencement of strong contractions. In such cases, the ewe was assisted to complete parturition.

The majority of the ewes which had lambed during the first seven days were drifted to an adjoining paddock. Lambs were tagged, weighed and branded daily to assist detection of cross-mothering. All dead lambs were autopsied to determine whether they had breathed, walked and sucked prior to death.

The body condition of the ewes was assessed as varying from fair to poor and was similar in ewes of each age group. An adequate supplement of pasture hay and oat grain was fed daily in the observation paddock.

The behaviour data on young and older ewes as influenced by length of labour was analysed by chi square test.

III. RESULTS

(a) Lamb losses

Of all the lambs born, 39 per cent died — 42 per cent of the lambs from young ewes and 36 per cent of those from older ewes. Infections, malpresentations and dystocias were not implicated in any of the deaths.

In Table 1, the chief factors associated with the death of the lambs are classified according to whether they are related to attributes and actions of the lamb, or to the post-natal behaviour of the ewe. Lamb factors, including weather effects, were held responsible for 74 per cent of all mortalities in the lambs from young ewes and 82 per cent of those in the lambs of older ewes. The remaining deaths, 26 and 18 per cent of lambs respectively, were attributed to aspects of post-natal behaviour of the ewes. Of the maternal factors, desertion of the lamb was the most important factor, considered responsible for 17 per cent of the deaths of single lambs from young ewes but only 6 per cent of those in older ewes. Maternal interference as distinct from maternal neglect accounted for 5 per cent of deaths from young ewes and 1.5 per cent cent from older ewes.

Prelambing maternal interest was not common among the ewes. It was observed in only 14 of the 235 ewes and was less prevalent in the young ewes (2 per cent) than in the older ewes (9 per cent). In-general, the ewe lost interest in the alien lamb before or during labour and the newborn lamb received her attention. Confusion over ownership was considered to contribute to only three deaths (Table 1).

(b) Ewe Behaviour

Observations for 29 ewes were incomplete and so these sheep were discarded in the analysis of the data on ewe behaviour. The mean length of labour for young
ewes was 33 min (range 6-200 min) and for old ewes was 37 min (range 2-344). The distribution of duration of labour was skewed so that in only about 27 per cent of ewes were labour times above the mean. The relation between ewe behaviour, and labour time is presented in Table 2.

Of the ewes taking more than 3 min to rise after lambing, 55 per cent had labour times above the mean whereas only 19.5 per cent of ewes rising in less than 3 min had prolonged labour times. This difference was highly significant. Of the ewes which deserted their lambs, 53.2 per cent had labour times above the mean and this differed significantly from the 18.5 per cent of ewes not deserting lambs which had longer labour times.

For ewes which did not stand still during first suckling, the proportion having prolonged labour was not different from that of ewes which did stand still.

Young ewes taking more than 3 min to rise after lambing were 26 per cent of the age group compared to 16 per cent for older ewes, but the difference was not statistically significant (Table 3). Likewise, 26 per cent of young ewes and 21 per cent of older ewes deserted their lambs but again the difference was not significant. However, few older ewes deserted their lambs without even smelling them but tended rather to either graze away from the lambs or rejoin the flock and return intermittently. By contrast most desertions by maiden ewes involved the complete neglect of the lamb.

### Table 1

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>YOUNG EWES</th>
<th>OLDER EWES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Singles</td>
<td>Twins</td>
</tr>
<tr>
<td><strong>Lamb Factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Still-born</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td><strong>Lamb Vigour</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failed to stand</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Stood and sought udder</td>
<td>7</td>
<td>—</td>
</tr>
<tr>
<td><strong>Progress Unhindered</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sucked but died</td>
<td>9</td>
<td>—</td>
</tr>
<tr>
<td><strong>Weather</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat</td>
<td>3</td>
<td>—</td>
</tr>
<tr>
<td>Loss</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>28</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maternal Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maternal Neglect</strong></td>
</tr>
<tr>
<td>Ewe deserted lamb at birth</td>
</tr>
<tr>
<td>Ewe interested in another lamb</td>
</tr>
<tr>
<td><strong>Maternal Interference</strong></td>
</tr>
<tr>
<td>Ewe failed to stand still</td>
</tr>
<tr>
<td>Ewe lying after birth</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Survival</th>
<th>Young Ewes</th>
<th>Older Ewes</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of lambs born</td>
<td>92</td>
<td>165</td>
</tr>
<tr>
<td>Survival of twins</td>
<td>3/6 = 50%</td>
<td>14/42 = 33%</td>
</tr>
<tr>
<td>Survival of singles</td>
<td>30/63 = 58%</td>
<td>90/123 = 73%</td>
</tr>
</tbody>
</table>

The relation between ewe behaviour, and labour time is presented in Table 2.
TABLE 2

Behaviour of young and older ewes in relation to length of labour

<table>
<thead>
<tr>
<th>Behaviour of ewe</th>
<th>Age of Ewe</th>
<th>Distribution according to length of labour</th>
<th>$\chi^2$†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>&lt;mean No. &gt;mean</td>
</tr>
<tr>
<td>(a) Lying after delivery—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;3 minutes</td>
<td>Young</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Older</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>&lt;3 minutes</td>
<td>Young</td>
<td>46</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Older</td>
<td>86</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>132</td>
<td>32</td>
</tr>
<tr>
<td>(b) Attention to lamb—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soon deserted</td>
<td>Young</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Older</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>22</td>
<td>25</td>
</tr>
<tr>
<td>Not deserted</td>
<td>Young</td>
<td>44</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Older</td>
<td>84</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>128</td>
<td>29</td>
</tr>
<tr>
<td>(c) Movement during first suckling—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not standing still</td>
<td>Young</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Older</td>
<td>23</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>39</td>
<td>11</td>
</tr>
<tr>
<td>Normal</td>
<td>Young</td>
<td>40</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Older</td>
<td>71</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>111</td>
<td>43</td>
</tr>
</tbody>
</table>

† Chi-square values within behaviour groups and between totals.

IV. DISCUSSION

The results presented relate to a flock of 235 Merino ewes held during lambing in a small paddock of 1 ha. Such a stock density is possible on a pasture for only a short period, but it represents the density required if ewes are to be brought into small areas to be given the benefit of control and such shelter from wind as is available from farm plantations (McLaughlin et at. 1970).

The flock was in fair to poor condition and this could have contributed to mortality due to any cause associated with lamb vigour. The lamb mortalities attributed to maternal behaviour represented 21 per cent of total deaths. Despite the very high rate of stocking, the incidence of mothering strange lambs and confusion over ownership was very low. If such stocking rates during lambing had advantages in control, or in the provision of shelter, they should not be unacceptable by reason of the effect of density on the behaviour of ewes.
TABLE 3

Behaviour of young and older ewes

| Behaviour of ewe                  | Distribution according to age | $X^2$  
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young</td>
<td>Older</td>
</tr>
<tr>
<td>(a) Lying after delivery—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$&gt; 3$ minutes</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>$&lt; 3$ minutes</td>
<td>56</td>
<td>108</td>
</tr>
<tr>
<td>$&gt; 3$ minutes</td>
<td>26.3</td>
<td>15.6</td>
</tr>
<tr>
<td>(b) Attention to lamb—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soon deserted</td>
<td>20</td>
<td>27</td>
</tr>
<tr>
<td>Not deserted</td>
<td>56</td>
<td>101</td>
</tr>
<tr>
<td>% soon deserted</td>
<td>26.3</td>
<td>21.1</td>
</tr>
<tr>
<td>(c) Movement during suckling—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>not standing still</td>
<td>19</td>
<td>31</td>
</tr>
<tr>
<td>Normal</td>
<td>25.0</td>
<td>97</td>
</tr>
<tr>
<td>% Not standing still</td>
<td>57</td>
<td>24.2</td>
</tr>
</tbody>
</table>

† Chi-square values within behaviour groups and between totals.

There were minor differences between the age groups in that a higher proportion of young ewes took more than 3 min to rise after lambing and more of them deserted their lambs. These differences were not statistically significant but, taken together, indicate a trend which is supported by the difference in the manner of desertion between the age groups.

The mean labour time and the skewed distribution of this parameter were similar for young and older ewes. Two aspects of ewe behaviour, namely, time to rise after lambing and the incidence of desertion, were associated with prolonged labour. This observation confirms those of Wallace (1948) and Alexander (1960) who concluded that prolonged labour reduced mothering ability.

V. ACKNOWLEDGMENTS

I am indebted to my loyal band of observers at the Pastoral Research Station, and to Drs. Arnold and Peter Morgan of the C.S.I.R.O. Laboratories, Perth, for their encouragement and guidance. Thanks are also due to Mr. A. H. Bishop and Dr. R. H. Watson for their helpful criticism of this paper.

VI. REFERENCES