**EverGraze: pastures to improve lamb weaning weights**

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**Introduction**

Lambing in late winter or spring has been shown to increase the profitability of sheep production compared with earlier autumn or winter lambing (Warn *et al.*, 2006). However, later lambing also increases the risk that pastures will senesce while lambs are young. This can result in slower lamb growth rates and, if lambs do not achieve adequate weaning weights, higher mortality and failure to meet target sale or management liveweights. Weaning weights of around 20 kg are recommended to achieve weaner survival rates above 90% (Hodge, 1991), although management of weaners rather than absolute liveweight determines survival rates (Hatcher *et al.*, 2008; Hocking Edwards *et al.*, 2008).

Recent years of low spring rainfall in southern NSW has highlighted the risk of low weaning weights. Producers can reduce this risk and optimise profits with knowledge of the probability of early pasture senescence for their region. This paper describes weaning weights in an experiment where breed of lamb, pasture type and stocking rate were altered, and uses simulated data to determine the risk of low weaning weights at different lambing dates.

**Methods**

The experiment was conducted on an EverGraze Proof Site near Tarcutta, NSW, in 2006, 2007 and 2008. The study comprised three grazing systems; late lambing, high lucerne and split joining. All systems had similar mid-winter stocking rates. Each of the three replicates of each system consisted of 5 ha paddocks fenced into three sub-paddocks with a different pasture (all with companion sub clover) in each paddock, shown in Table 1. The ewes in the late lambing and high lucerne treatments were joined to Merino and terminal rams (50% of ewes to each) for four weeks to lamb from the first week of September. In the split joined treatment, half the ewes were joined to terminal sires to lamb in July, and the other half to lamb to Merino rams over four weeks in September. Ewes were managed similarly to achieve condition scores of 3 pre-lambing, and supplementary fed when required. As the quantity of pasture declined prior to weaning, ewes were fed sufficient hay and grain to maintain maternal liveweight and allow 100g/d lamb growth, estimated using the computer program GrazFeed. Lambs born in September were weighed at weaning in the first week of December in all years, aged 9 to 14 weeks, and then sold. Split joined crossbred lamb weights are not reported due to the different lambing and
weaning times; July born lambs remained in the system as long as pasture conditions allowed good growth (200g/day) or export weights were achieved. Replacement ewes were purchased each year. Experimental weaning weights were analysed using REML in Genstat.

Simulations were conducted using GrassGro version 3.0.5. To examine the risk of producing lambs less than 20 kg at weaning with different lambing times, a phalaris/sub clover pasture was simulated at Tarcutta using weather data from 1946 to 2008. The ewes were stocked at 8 ewes/ha and supplemented to maintain the condition score of the lightest ewes above 2.0. The only variable changed between runs was lambing time. All lambs are born on a single day for each lambing date.

Table 1. Description of treatments

<table>
<thead>
<tr>
<th>% pasture area (phalaris; tall fescue; lucerne)</th>
<th>late lambing</th>
<th>high lucerne</th>
<th>split joining</th>
</tr>
</thead>
<tbody>
<tr>
<td>ewes/ha</td>
<td>60;20;20</td>
<td>45;15;40</td>
<td>60;20;20</td>
</tr>
<tr>
<td>lambs weaned/ewe joined (%)</td>
<td>8.5</td>
<td>8.5</td>
<td>6.1</td>
</tr>
</tbody>
</table>

Results

Experimental lambs

Annual rainfall was below the long term average of 575 mm in 2006, 2007 and 2008 (252, 505 and 536 mm, respectively). In all years monthly rainfall in September and October of 8 to 32 mm was well below the long-term average of 50 to 60 mm for those months (between percentile 4 and 12 for the years 1908 to 2008), resulting in low pasture growth in spring and earlier than normal senescence.

Mean lamb weaning weights were higher in 2007 (Merino 24.8 kg; crossbred 30.6 kg) than in the drier years (Merino 18 to 19.5 kg; crossbred 25 kg). Increasing the proportion of lucerne in the system, or carrying a lower stocking rate, did not affect weaning weights (Table 2) ($P>0.05$). Female Merino lambs were 2 kg lighter ($P<0.05$) than male lambs, but female crossbreds were not.

Table 2. Weaning weights of lambs

<table>
<thead>
<tr>
<th></th>
<th>late lambing</th>
<th>high lucerne</th>
<th>split joining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merino weight (kg)</td>
<td>20.5</td>
<td>20.8</td>
<td>21</td>
</tr>
<tr>
<td>Crossbred weight (kg)</td>
<td>25.7</td>
<td>25.7</td>
<td>n/a</td>
</tr>
</tbody>
</table>

The proportion of Merino lambs weighing 20 kg or less was much larger than that of crossbred lambs (40% versus 11%) over the three years. Within years it was always
at least double. Approximately twice as many both Merino and crossbred female lambs were 20 kg or less compared with male lambs in 2006 and 2007. Between 70 and 80% of Merino female lambs were 20 kg or less in 2006 and 2008.

**Simulated production**

When grazed at a stocking rate of 8 ewes/ha, the simulated phalaris/sub clover pasture was predicted to produce a spring peak of 3 t DM/ha total live herbage on average (50th percentile) (Figure 1). The quantity of live pasture on average declined rapidly from mid October, but in the least productive 10% of years, declined from early September.

The digestibility of pastures was on average above 70% until mid November (Figure 2). In the worst 10% of years it declined below 70% from mid September.

![Figure 1. Predicted live herbage mass (kg DM/ha) at the 10th, 50th and 90th percentiles (1946-2008) in a grazed phalaris pasture.](image)

The mean liveweight of simulated Merino ewe lambs was higher than 20 kg by early December even at the latest lambing (20 September) in average years (50th percentile). However, in the worst 10% of years (Figure 3) the earliest born lambs (27 August) did not achieve 20 kg liveweight until mid November, and later born lambs did not achieve this weight by early December.

**Discussion**

In the drought years of this study, increasing the proportion of lucerne in the grazing area did not improve lamb weaning weights. This is not surprising because spring rainfall was around the 10th lowest percentile. If any significant rainfall events had
Figure 2. Predicted digestibility of the live component of a phalaris pasture (kg DM/ha) at the 10th, 50th and 90th percentiles (1946-2008).

Figure 3. Liveweight of Merino ewe lambs born on 27 August, 10 September or 20 September at the 10th percentile (1946-2008).
occurred lucerne may have the ability to respond better than annual species, which would be completing their life cycle and be unable to respond, or phalaris which would be entering semi-dormancy. A lucerne response to summer rainfall would promote the survival of low-weight lambs. As all the lambs were sold at weaning any advantage of significant summer rainfall to systems with a higher proportion of lucerne could not be measured.

At the rates included in the field experiment, a lower stocking rate (6.1 versus 8.5 ewes/ha) also did not improve weaning weights. This is most likely due to the early decline in pasture digestibility and protein content, well before weaning of September born lambs, such that pasture quality rather than quantity was the limiting factor.

The simulated results suggest the digestibility of live pasture was below 70% by late September. Lambs would have had little opportunity to grow before pasture quality had an adverse impact; the impact could be expected to be worse for those lambs born in late September, highlighting the need for short joining periods. Even if lambing commenced at the end of August, in a typical six week lambing period the expected 30% of lambs born after mid September would be expected to have slow growth rates due to inadequate pasture quality.

Female Merino lambs were the most at risk of not attaining an adequate weaning weight. The simulated data suggests that small changes to a September lambing date may have little impact on the ability of these lambs to achieve a 20 kg weaning weight by the time of pasture senescence under average spring pasture conditions, but that in poor years, even a 10 day delay in lambing will result in low weight gains as pasture quality declines. The simulated data only reports the average liveweight so a large proportion of lambs could be expected to be below adequate liveweight. In the observed flocks, low lamb weights occurred despite adequate feeding of the ewes, possibly due to competition between the ewes and lambs. In practice this is difficult to prevent.

Previous recommendations suggest the optimum lambing time for store lamb-producing enterprises is four months prior to the end of the pasture growing season (Warn et al., 2006), assuming a target of selling lambs by 18 weeks of age. Although not commercially a common practice, the target age and weight in our study was lower (30 kg for Merinos and 35 kg for crossbred lambs in an average season at weaning at 12 weeks of age). Selling lambs at weaning at these weights in a September lambing dual-purpose flock has been estimated to be more profitable than a July lambing self-replacing Merino flock (Friend et al., 2007). Assuming the growing season ends at the end of November/early December, September lambing allows lambs to be sold at the end of the season.
Variability of seasons means that even with an optimum lambing date, there will be years when pastures finish early. In these years slight differences in lambing date may have a large effect on lamb growth and potentially survival. Producers aiming to lamb later in spring to maximise profits need to understand the risk of poor spring conditions and have plans to manage light lambs to ensure their welfare.

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References