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New insights into the management of ewes over summer and autumn

By Rob Kelly, Principal Officer, and Ian Ralph, Research Officer, Sheep and Wool Branch, South Perth

Recent research in Western Australia has provided new information on the effects of liveweight and liveweight change on wool production and quality, as well as lamb survival and growth.

Liveweight and liveweight change in sheep reflect the animals' nutritional status, and this in turn directly influences their wool production and reproductive performance.

The under-nutrition of sheep not only has an immediate effect on the animal's performance, but the research showed that it also produces a significant carry-over effect on wool and lamb production, even if the ewes have returned to good feed.

These findings suggest that for the efficient management of breeding ewes over the dry feed period, a representative sample of the flock (40 ewes or 10 per cent, whichever is the greater) should be weighed and condition scored regularly. Grazing management and/or supplements can then be adjusted to meet the production objectives for the ewe flock.

Wool production

Autumn lambing ewes generally produce less wool than those which lamb in June (Table 1).

Under paddock conditions, the lower wool production of lambing ewes is largely a result of the effects of lactation rather than pregnancy, and depends mainly on the feed available to the ewe during lactation.

Pregnancy, in itself, does not lower wool production. This is confirmed by recent work in the Eastern States (Williams, A.J. and Butt, J., 1989) in which either unmated ewes or ewes carrying one or two fetuses were fed from the 80th day of pregnancy until lambing to maintain their liveweight. Wool production over this experimental period was similar between the three groups of ewes. There were no 'other factors' involved. They concluded that the recognition of the greater requirements for nutrients by lambing ewes and the attempted provision of these nutrients in feed was a prerequisite of the sound nutritional management of breeding flocks.

New information on the carry-over effects of under-nutrition comes from research in Western Australia where the effects of supplementary feeding in autumn on wool production were tested in a 1987 experiment at Mt

Table 1. A comparison of wool production from unmated, June lambing and April lambing ewes at Mt Barker Research Station, 1987

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<tr>
<td>Dry ewes</td>
<td>4.1 kg clean</td>
</tr>
<tr>
<td>June lambing ewes</td>
<td>3.5 kg clean</td>
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<tr>
<td>April lambing ewes</td>
<td>3.2 kg clean</td>
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Barker. Dry, pregnant and lactating Merino ewes were fed the same range of lupin seed supplements for eight weeks, starting in April. At all other times the ewes were run as one flock. Changes in wool production were measured during the feeding period and at the annual shearing in the following spring.

The results showed that changes in liveweight over April and May, induced by the range in feeding rates, were linked closely with changes in wool growth. Wool production varied between 3 and 8 g/ewe/day, with, for example, the ewes that lost 5 kg over the two months growing 120 g less wool than ewes that maintained their weight.

More significantly, the change in the amount of wool grown in autumn was followed by substantial changes in wool growth after the ewes were removed from their feeding treatments and run as one flock. This is the new insight into the effects of under-nutrition. This carry-over effect meant that the ewes produced an extra 200 g of wool for every 100 g of wool grown in the experimental period. By the time the sheep were shorn in October, for every kilogram of weight lost during autumn:

- clean fleece weight decreased by 80 g,
- mean fibre diameter of the fleece decreased by 0.2 micron, and
- mean staple breaking force decreased by 2.4 Newtons/Ktex.

In other words, in comparison with a flock in which liveweight was maintained over autumn, a flock of ewes that lost 5 kg over these two months produced 0.4 kg less clean wool per ewe, which was one micron finer and 12 Newtons/Ktex weaker.

### Lamb production

#### Joining

In Western Australia, most ewes are joined over the November to March period. Consequently, during the period of joining and for much of pregnancy the ewes graze dry pastures or stubbles which limit their productivity.

Sometimes, ewes can graze feeds (for example, lupin stubbles with large amounts of split seed) that will be above maintenance requirements, but this usually only lasts for several weeks. Generally, over extended periods of grazing and without supplementation, the poor quality of our dry summer/autumn feeds dictates that, at best, liveweight will be maintained. Therefore, management of the breeding ewe flock over the preceding period of green feed decides the weight of the ewes at joining, and hence potential lamb drop.

![Figure 1](image-url) Changes in fertility and fecundity with liveweight of the 4-tooth ewe (between flock data, 1988 and 1989).

On-farm studies, supported by funds from the Australian Wool Corporation over the past three years, indicate that in a flock of 100, 4-tooth ewes joined over December and January, for every 5 kg increase over the 40 to 60 kg weight range the number of ewes lambing (fertility) will increase by 1.5 ewes, and the number of twins born will increase by 7 ewes, giving about 8.5 more lambs born (Figure 1). (See Bulletin 4148 'Management for high lambing performances from ewe flocks in the agricultural areas' for other factors related to preparation of ewes and rams for joining, and management over joining.)

#### Pregnancy

From conception through to birth, less than 2 per cent of fetuses in single and twin bearing ewes are lost if their body condition is maintained throughout pregnancy. However, twin bearing ewes that lose up to 10 kg from the 30th to the 100th day of pregnancy can lose up to 10 per cent of fetuses.
Since nutrients are transferred through the placenta from the ewe to the fetus, it is not surprising to find that placental weight is closely correlated with lamb birth weight. Placental growth and development precede the period of rapid fetal growth, that is, it is set up in mid pregnancy to meet the needs of the rapidly growing fetus in late pregnancy (Figure 2).

Placental size, as measured by its weight, reaches a maximum at about the 80th day of pregnancy, and thereafter declines slightly until term. After this early period of growth, there is a 30 day period of vascular development to the 110th day of pregnancy, during which time the blood vessels and capillaries within the cotyledons (the points of attachment of the placenta to the uterine wall) become bigger.

At about the 80th to 90th day of pregnancy, the placenta and its fetus each weigh about 400 to 500 g. By term, the placenta weighs slightly less, but the fetus has grown to about 10 times the weight of the placenta. Recent studies have shown that the size of the placenta and its development in mid pregnancy are reduced by:

- poor nutrition of the ewe in mid pregnancy;
- low weight of the ewe;
- the presence of another fetus (that is, twins or singles); and
- high temperatures during mid pregnancy.

The consequences then of low liveweight and poor nutrition of the ewe during pregnancy are:

- increased fetal deaths,
- low lamb birth weights and poor vigour at birth,
- decreased energy reserves in the lamb, and
- poor mothering ability of the ewe.

Therefore it was not surprising to find in the on-farm studies that 57 per cent of the variation between farms in lamb mortality was associated with the ewe's weight in mid pregnancy and weight change during pregnancy. The most important factor was the ewe's weight in mid pregnancy (Figure 3).
Recommendations and implications

Recommendations for management of the ewe flock based on the results of this research are as follows:

- Ensure that the average liveweight of the 4-tooth and older ewe flocks is above 50 kg at joining, and at condition score 3.

![Graph showing association between lamb growth to marking and ewe weight in mid pregnancy across different farms, 1989.](image)

Lamb growth

Lamb growth to marking varies considerably between flocks. Our on-farm studies have shown that between 63 and 79 per cent of the variation between flocks is associated with ewe weight and condition score over mid to late pregnancy and early lactation. The association between ewe weight in mid pregnancy and lamb growth to marking for 1989 is shown in Figure 4.

Conclusions

Wool and lamb production are influenced by the nutritional management of ewes over summer and autumn. Most importantly, there are benefits that carry over in the form of increased wool production, lamb survival and growth.

Early planning of feed requirements, including sound grazing management over spring so that ewes enter summer with good liveweight and condition, and monitoring of liveweight and condition score during summer and autumn, are essential for efficient sheep management.