The development of a maternal ewe efficiency index for the Mount Ronan flock

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In a modern prime lamb producing flock, the target is to maximise profitability per hectare. The maternal ewe is the basic unit from which production stems, and therefore she must be a highly efficient and productive animal.

In the Mount Ronan flock, we are looking to identify the most efficient ewes. Utilisation of ASBVs are aiding in the selection of fertile ewes with good growth and carcase characteristics, however there are three additional characteristics of ewe efficiency which we are working to quantify;

The ability of ewes to produce their own body weight in lamb at 100 days

Ewes which are more moderate in size, but still produce heavy, fast-growing lambs

Ewes which are more resilient to live weight loss during lactation and periods of feed shortage

1. The ability of ewes to produce their own body weight in lamb after 100 days of lactation

Ewe efficiency index already in use by Australian sheep industry: $\frac{\text{Kg lamb weaned at 100 days}}{\text{ewe joining weight}}$

Based on this index, the top ewe in 2014 (with a joining weight 68kg, and producing 96.6kg lamb at 100 days) had an efficiency of 142%. In fact many ewes are far exceeding the target of 100%.

One key limitation of this index is that it does not take into consideration the condition score (CS) of the ewe at joining. In years when there is significant flock variation, this results in penalising ewes which are heavier due to being in better condition. We do not want to select against these potentially 'better doing' ewes.

2. Ewes which are more moderate in size, but still produce heavy, fast-growing lambs

Within the Mount Ronan flock, we have recorded a variation of up to 60kg within ewes of the same CS!! This means there is a lot of potential for selection of ewes with a more moderate animal size. Since 2013, we have been collecting paired WT/CS data for each ewe up to three times a year. I have been using this data to compute standard reference weights (SRWs) for each ewe. Paired measurements are plotted on a linear regression model and the live weight of the ewe at CS 3 is estimated.

For ewes with more than three data points, their estimated SRW is quite accurate (R^2 value of line of best fit is high). Individual SRWs are then substituted into the original ewe efficiency index in the place of joining weight. I am also using multiple years' lambing data in the equation, giving an average efficiency rather than solely focussing on one lambing.

Modified ewe efficiency index: $\frac{\text{Average kg lamb weaned at 100 days (multiple lambings)}}{\text{ewe standard reference weight}}$

This index is a work in progress. With the addition of annual WT/CS data and lambing data, the computed ewe efficiency index is better able to identify the elite ewes. We have identified that many elite ewes are among the oldest in the flock, and would otherwise have been overlooked and culled due to lower ASBVs.

3. Ewes which are more resilient to live weight loss during lactation and periods of feed shortage

I am now beginning to work on the identification of more resilient ewes. I aim to identify those that lose less live weight throughout the year (whilst maintaining high lamb production), as well as those which may lose weight, but respond quickly to supplementary feeding and bounce back cheaply after weaning.

Data collection began with ewe WT/CS recorded at weaning in 2015 when ewes were separated into three nutritional groups based on CS. I plan to work this future resilience data into the ewe efficiency index.