Determining lamb growth rate during development

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SUMMARY
Lamb growth rate is an important determinant of on-farm productivity and profitability. Growth rate varies according to stage of development, which causes variation in meat quality traits. Therefore, developmental traits such as muscle metabolic type and intramuscular fat content are likely to be influenced by early and midlife growth, whereas traits such as the transient storage of muscle glycogen are more likely to be aligned with pre-slaughter growth (Pethick *et al.* 2004). An accurate model of all phases of growth is necessary to predict the effect of growth rate on meat quality traits.

Lamb growth can be modelled using the Brody function, the parameters of which describe birth weight, average mature weight and maximum growth rate at a given time (Brody, 1945). The Brody function did not predict growth in the weeks immediately before slaughter accurately because the weight of lambs within several management groups plateaued when pasture dried off and then increased rapidly when they were finished on grain (Figure 1). Cubic polynomial functions can be used to provide a more precise fit for pre-slaughter growth because they offer greater flexibility in simulating a late rapid increase in liveweight. Therefore, it was hypothesised that a cubic function would fit the liveweight data of these lambs with greater precision than a Brody function.

Lambs (n = 3399) born in 2007 at seven sites of the Information Nucleus Flock experiment were weighed throughout their grow-out period, resulting in 32,159 observations. Brody and cubic functions were fitted to the liveweight data of each lamb and residual weights (difference between the observed and predicted weights) were analysed using a general linear model with age (week) as a fixed effect, adjustments for site, sex, birth type-rear type, sire type, dam breed within sire type and management group within site, and random terms for sire and dam.

When the standardised sums of squared errors were compared, the cubic function was superior to the Brody function (3.36 *v.* 6.40, respectively; Figure 2). During late growth (days 301–450), the error associated with the Brody function was larger than that associated with the cubic function (15.98 *v.* 6.49, respectively) but the errors of both functions were high, indicating that neither function fitted the data well.

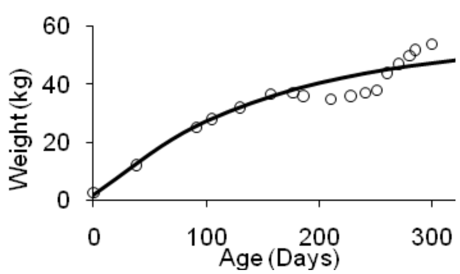

Figure 1. Brody function fitted to the liveweight data of an individual lamb

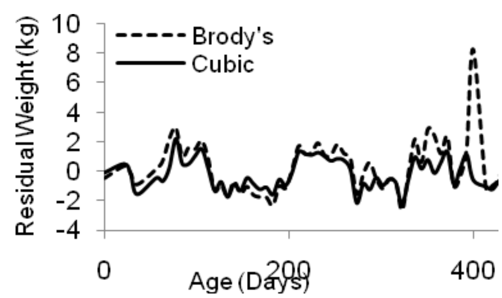

Figure 2. Average residual values for the Brody and cubic functions fitted to liveweight data for all lambs.

The cubic function provided a better fit to the liveweight data than the Brody function. The relatively poor fit of both functions to data from some management groups during the late growth phase indicates that further modelling is required for these sites.

REFERENCES
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