Modeling of crossbred cattle growth, comparison between cubic and piecewise random regression models

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ABSTRACT. Two analyses, cubic and piecewise random regression, were conducted to model growth of crossbred cattle from birth to about two years of age, investigating the ability of a piecewise procedure to fit growth traits without the complications of the cubic model. During a four-year period (1994-1997) of the Australian "Southern Crossbreeding Project", mature Hereford cows (N = 581) were mated to 97 sires of Angus, Belgian Blue, Hereford, Jersey, Limousin, South Devon, and Wagyu breeds, resulting in 1141 steers and heifers born over four years. Data included 13 (for steers) and eight (for heifers) live body weight measurements, made approximately every 50 days from birth until slaughter. The mixed model included fixed effects of sex, sire breed, age (linear, quadratic and cubic), and their interactions between sex and sire breed with age. Random effects were sire, dam, management (birth location, year, post-weaning groups), and permanent environmental effects and for each of these when possible, their interactions with linear, quadratic and cubic growth. In both models, body weights of all breeds

increased over pre-weaning period, held fairly steady (slightly flattening) over the dry season then increased again towards the end of the feedlot period. The number of estimated parameters for the cubic model was 22 while for the piecewise model it was 32. It was concluded that the piecewise model was very similar to the cubic model in the fit to the data; with the piecewise model being marginally better. The piecewise model seems to fit the data better at the end of the growth period.

Key words: Crossbred cattle; Growth; Cubic; Random regression; Piecewise