

THE EVALUATION OF THE GROWTH PARAMETERS OF SIX SOUTH AFRICAN COMMERCIAL CROSSBRED PIG GENOTYPES

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ABSTRACT

Simulation modeling is an active part of animal nutrition. These complex programs rely on mathematical functions to predict the performance of an animal. The Gompertz equation is a simple, but accurate function that fits animal growth data well. In conjunction with allometry, the growth of a specific genotype can be predicted. Only three parameters are needed to sufficiently describe a genotype, *viz.* protein weight at maturity (P_m), the Gompertz growth rate parameter (B) and the lipid to protein ratio at maturity (LPR_m). These descriptors are lacking for commercial pig genotypes in South Africa, and this hinders the use of models in simulating nutrient requirements. It is the aim of this thesis to estimate these parameters in six South African pig genotypes. Thirty pigs from each of six commercial genotypes were analysed using a serial slaughter method in which pigs were slaughtered at 4 and 14 days of age, and at 30, 40, 70, 80, 90 and 100kg live weight. The animals were choice fed and were housed in conventional housing facilities. Analyses for protein, lipid, water, and ash contents of the empty body at the respective weights were performed. The results indicated that there were no significant differences between the six genotypes in terms of mature weights or B of the various body chemical components, or between the B values estimated for all components across genotypes. The mean of the estimated values for P_m , B and LPR_m were 38.8 ± 2.1 kg, 0.012 ± 0.004 day⁻¹, and 1.16 kg/kg respectively and can therefore be used to adequately describe all six genotypes. The assumption made that all body components have a similar B value is supported.

To investigate the possible effects of the environment on growth, a comparative trial was performed on 20 pigs each from genotypes 4, 5 and 6 using chambers in which the temperature could be controlled to within 1°C of the setting. All other experimental methodologies were similar to those adopted in the first experiment. No significant differences were found between the two housing facilities, in terms of the genetic parameters, within the respective genotypes supporting the findings of the previous trial. It may therefore be possible to estimate B using the live weight and estimating P_m and lipid at maturity using allometry, instead of going to the expense of a full serial slaughter trial. The allometric coefficients relating lipid, water and ash to protein were 1.18, 0.88 and 0.97 respectively.