

1 **Calibration and sensitivity analysis of a model of the growing pig.** D. M.

2 GREEN AND C. T. WHITTEMORE. *University of Edinburgh School of*
3 *Geosciences, Agriculture Building, The King's Buildings, West Mains Road,*
4 *Edinburgh EH9 3JG, UK*

5 A mechanistic model of pig growth and nutrition, in terms of the retention of protein,
6 lipid and live weight, was constructed with a view to its inclusion in an integrated
7 management system for pig production (IMS) (Green & Whittemore, 2003;
8 Whittemore et al., 2001). Initial model testing was by evaluation against a variety of
9 independent data sets; however, model calibration and sensitivity analysis was
10 considered a more beneficial and informative method of model evaluation.

11 Model parameter calibration using a revised Simplex algorithm was performed
12 against data from pigs of three types ('meaty', 'lean', and 'fatty'). A number of key
13 parameters of biological interest that had an empirical origin were calibrated: those
14 for rates of tissue turnover, maintenance, and growth. After calibration, the estimates
15 for these parameters were found to be close to those expected from experimental
16 results. This would support both the use of such calibration in the testing of the
17 model, and the methodology used in the construction and assembly of the model
18 algorithms.

19 Sensitivity analysis of both the above and additional parameters indicated that the
20 parameters could be divided into two groups: those controlling partitioning of
21 nutrients into protein and lipid, and those controlling efficiency of nutrient
22 conversion into biomass. For use in a real-time IMS system, model results suggest
23 that a combination of the above classes of parameters can be used for model
24 optimisation.

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27 GREEN, D. M. & WHITTEMORE, C. T. (2003). Architecture of a harmonised model of the growing
28 pig for the determination of dietary net energy and protein requirements and of excretions into the
29 environment (IMS Pig). *Animal Science* **77**, 113-130.

30 WHITTEMORE, C. T., GREEN, D. M. & SCHOFIELD, C. P. (2001). Nutrition management of
31 growing pigs. In: *Integrated management systems for livestock* (Eds. Wathes, C. M., Frost, A. R.,
32 Gordon, F. & Wood, J. D.) *BSAS Occasional Publication No. 28*. BSAS, Edinburgh. 89-95.