

Book review

A Quantitative Biology of the Pig. Edited by I. Kyriazakis. Wallingford: CAB International. 1999. Hardback, pp. 408. £60.00 (US\$110.00). ISBN 0 851 99273 0

Over the past two decades, there has been much effort aimed at describing quantitatively the basic principles underlying growth and reproduction in pigs which could serve as a background for mathematical models simulating pig performance. The book *A Quantitative Biology of the Pig* is the first comprehensive publication covering this area.

The book is organized into four parts with sixteen chapters written by eminent specialists from around the world, most of whom are actively involved in mathematical modelling. The text contains numerous tables and informative figures and each chapter is extensively and individually referenced. The book concludes with a reasonably complete index.

Following an introductory Chapter 1, in which the need for a theory in pig biology is justified, the first part 'Describing the Elements of the System' concentrates on defining the genetic potential of the pig (Chapter 2), the chemical and physical characteristics of its food (Chapter 3) and the environmental and social conditions under which it is kept (Chapters 4 and 5). The quantitative description of the system is a key component of any effective model. Yet, many unanswered questions still remain and need to be addressed in order to improve the understanding of factors that determine animal performance. For example, very little quantitative information is available on the infectious environment and the level of immune system activation which may strongly affect pig performance. It is worth noting that the first step has been made in Chapter 4 by examining the effects of a respiratory disease, pleuropneumonia, on food intake, energy metabolism and body composition of pigs.

Four chapters in Part 2 'Processes and Control', are devoted to the quantitative description of biological processes taking place in the pig body. The topics covered include pregnancy (Chapter 6), lactation and neonatal

growth (Chapter 7) and postweaning growth (Chapter 8). This part incorporates a wealth of information enabling a reliable prediction of the main performance characteristics of both sows and growing pigs. Chapter 9 provides a useful review of endocrine control of metabolic processes and its quantification at tissue and whole-animal levels. One may regret that there is no mention of leptin, which is now believed to fill the role of the long-sought 'lipostat', regulating energy intake, appetite and body composition.

Part 3, 'Food Intake and Metabolism', consists of six chapters discussing the voluntary intake of food (Chapter 10), digestion and absorption of nutrients (Chapter 11), the metabolism of minerals (Chapter 12), protein (Chapter 13) and carbohydrates and lipids (Chapter 14). Energy metabolism and flow is described in Chapter 15. Of these topics, the prediction of voluntary intake of food is a particularly difficult area to quantify because of the complexity of interactions among numerous factors affecting food intake. The theory presented in Chapter 10, based on the concept of 'desired food intake' seems to be an advance over other systems. Nevertheless, its validity should be tested in practice under a range of environmental and dietary conditions. Protein metabolism and its central role in predicting growth rate represents another important topic and one might have expected a more detailed description of factors affecting the efficiency with which dietary amino acids are utilized for various physiological functions.

The book concludes with a look to the future (Part 4, Chapter 16). Various approaches to modelling as well as various kinds of models in pig biology are discussed there.

A Quantitative Biology of the Pig is a well written book. It successfully integrates the many and varied aspects of mathematical modelling and will be extremely useful to advanced students, animal scientists and to all who have an interest in the scientific principles underlying pig growth and reproduction.

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