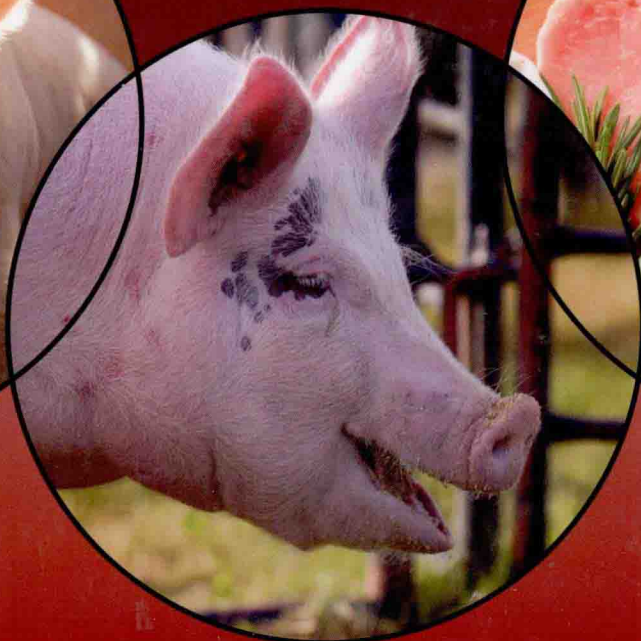
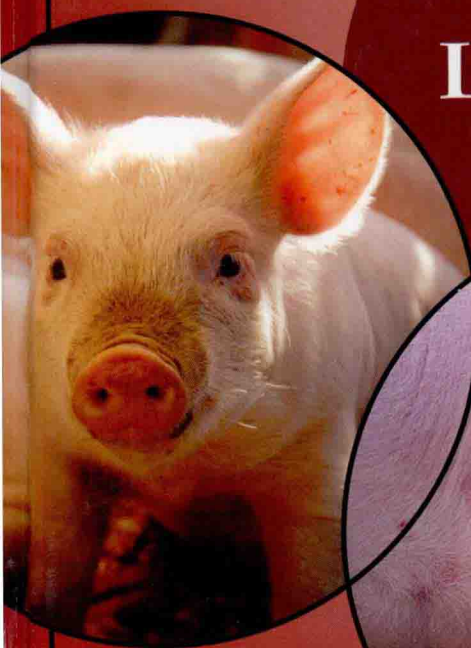


Sustainable Swine Nutrition

EDITED BY
Lee I. Chiba



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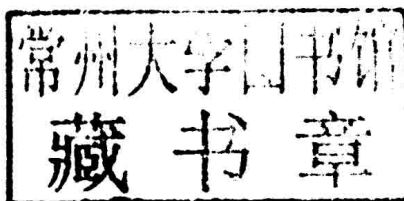
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Sustainable Swine Nutrition

Dedication

This book is dedicated with appreciation to my wife, Shoko. Her continuous support, patience, and willingness to give me “space” to take on challenges such as this are forever cherished!

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Preface

Swine nutrition is a dynamic and rapidly changing science. New information is generated and added to the field of swine nutrition continuously, expanding the fundamental knowledge base. Obviously, all the information would be extremely important for successful and sustainable commercial swine production. To utilize the information effectively, all those recent developments or current advances in swine nutrition must be put into a proper context simply because of the diversity of such information. We have many books that cover various aspects of swine nutrition, but, unfortunately, there are not many books that are specifically designed to address pertinent issues necessary for “successful and sustainable swine production.” I am hoping that this book will fill the void and make contributions to the development of environmentally friendly feeding strategies for successful and sustainable swine production.

In commercial swine production, the main objective of diet formulation and feeding strategy is to maximize profits, which does not necessarily imply maximal animal performance. To maximize the economic efficiency, therefore, it is advantageous to supply energy and indispensable nutrients as close as possible to meeting but not exceeding the requirements of the pig. Such optimum feeding strategies would contribute greatly to the efficiency of energy and nutrient utilization, which helps ensure continuous availability of quality sources of energy and nutrients for future swine production, and produce a positive impact on today’s environmentally conscious society by reducing the excretion of unutilized nutrients. The development of such feeding strategies involves consideration of a multitude of factors such as genetic variations in the pig, variability, availability, and stability of nutrients in feed ingredients, interactions among nutrients and non-nutritive factors, voluntary feed intake, physical and social environment, and others, and thorough, comprehensive reviews on some of those factors are, obviously, warranted.

The competition between humans and animals for quality sources of energy and nutrients is likely to increase continuously in the future because of ever-increasing world population and an increase in the economic development of both newly industrialized and less economically developed countries. Clearly, it is important for us to find alternative sources of energy and nutrients for swine production. Alternative feed ingredients have different feeding values because of variations in nutrient content and other factors such as bioavailability and stability, anti-nutritional factors, interactions among the nutrients and possibly with non-nutritive factors, and palatability. To utilize potential alternative sources effectively or efficiently can be, therefore, challenging, and we obviously need all the fundamental and applied nutritional information to accomplish such a daunting task. Furthermore, satisfying consumer demands for healthy and nutritious food and alleviating public concerns on the environmental issues are an integral part of successful and sustainable swine production. Therefore, addressing not only the nutritional issues associated with maximizing growth performance and the

utilization of energy and nutrients but also the issues associated with the carcass and pork quality and impacts of swine production on the environment are extremely important.

As a comprehensive book on swine nutrition, it is, obviously, important to cover some basic or fundamental aspects of nutrition, i.e., water, protein or amino acids, lipids, carbohydrates, energy metabolism, vitamins, minerals, and also nutrition and immunology. The emphasis of the present book is, however, on recent developments or current advances or some pertinent issues in each of those major areas. Therefore, some fundamental aspects will be reviewed briefly, and the focus of review is on the latest up-to-date information. Then, the remaining book is dedicated to the discussion of some specific, pertinent issues that may contribute to the ultimate goal or theme of the book, that is, to provide a comprehensive review on each pertinent area necessary for “successful and sustainable swine production.”

It is with the deepest sorrow to acknowledge the loss of Dr. David H. Baker, one of the contributing authors. Dr. Baker was Professor Emeritus of Nutritional Sciences and Animal Sciences at the University of Illinois at Urbana-Champaign. He was elected to membership in the National Academy of Sciences in 2005, which is considered as one of the highest and most prestigious honors that can be accorded to a scientist, in 2005. Dr. Baker received six major awards from the American Society of Animal Science, five major awards from the Poultry Science Association, and two major awards from the American Society of Nutrition. In addition, along with countless others, Dr. Baker received USDA Distinguished Service Award in Research and Charles A. Black Award from the Council for Agricultural Science and Technology. Dr. Baker published almost 600 peer-reviewed journal articles, a record that is not approached by anyone in the field today. Dr. Baker was a Fellow of the American Society of Animal Science, the Poultry Science Association, and the American Society of Nutrition. His legacy will certainly continue to inspire further research in the field of nonruminant nutrition and beyond.

This book would not have been possible without the help of my colleagues, and I would like to thank our contributors for their willingness to participate in this endeavor. I sincerely appreciate their time and dedicated effort on this book project. Also, I would like to thank my graduate students, Sean D. Brotzge and Chhabi K. Adhikari, for their assistance in reviewing and (or) formatting a reference section for each chapter.

Editor

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