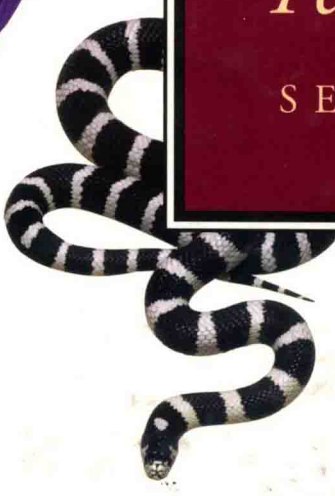
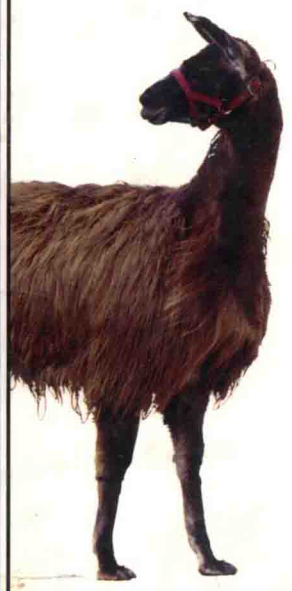


APPLIED
ANIMAL
NUTRITION
Feeds and Feeding
SECOND EDITION



PETER R. CHEEKE



Applied Animal Nutrition

FEEDS AND FEEDING

Second Edition

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Applied
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FEEDS AND FEEDING

PREFACE

The objective of this book is to describe the properties of feedstuffs used in the feeding of domestic animals and to provide information on feeding practices for a variety of domestic and exotic animal species. It is intended that the book be suitable as a text for undergraduate students, at both university and junior college levels. It should also be useful to professional animal nutritionists, extension agents, veterinarians, and livestock producers.

Recognizing this diverse audience, I have endeavored to make the presentation of subjects technically complete but not technically difficult. The writing style is one that should help accomplish this goal. Detailed discussion of metabolic pathways and use of chemical structures and terminology have been avoided. My philosophy is that these topics are better presented in a book on principles of nutrition, rather than in one on feeds and feeding. The literature citations are recent and serve as an entry to the literature for those who need more detailed information. Where possible, literature citations are from major journals that should be available at most university and college libraries. References are cited extensively in the text, to introduce and/or reinforce the concept of documenting statements with verifiable data from peer-reviewed scientific journals.

Animal agriculture is undergoing rapid industrialization and globalization, providing new challenges and opportunities. More than ever before, students should have some exposure to the implications of the global economy on their field of study. Various contentious issues impact animal feeding and nutrition. The emergence of BSE or “mad cow disease” in Great Britain has focused worldwide attention on the use of meat meal as a feed for livestock. *E. coli* contamination of beef has drawn public attention to the use of chicken excreta as an animal feedstuff. Harvesting fish and krill (Antarctic shrimp) for use as animal feed has raised environmental concerns. These types of contemporary issues, which impact animal feeding, are discussed throughout the book.

Awareness of environmental and ecological effects of livestock production is critical to Animal Science students if they are to be adequately prepared for coping with the challenges of the twenty-first century. These challenges include the continually increasing human population coupled with rising expectations for an improved diet, the emergence of a global economy, increased public concerns about exploitation of natural resources and environmental degradation, and continuing food safety concerns, many involving animal products (e.g., microbial contamination, BSE). Air, water, and soil pollution associated with intensive animal production is becoming a major issue. Aspects of “ecological nutrition” with nutrient management used to minimize environmental impacts of animal production are discussed. Thus, I have endeavored to discuss animal feedstuffs within the larger framework of societal values and concerns. In keeping with the public mood and my own biases, the treatment of contemporary issues has an environmentally friendly slant. We should recognize that many students today have a sincere and very strong interest in preserving the environment and are turned off by a strictly economic “least cost, most efficient” bottom line.

Another unique feature of this book is my attempt to bridge the gap I perceive between Animal Scientists and Agronomists. Increasingly, students do not have a farm background, and they may have little practical knowledge of different crops and forages. They may know about alfalfa meal as an ingredient but have no idea of what sort of plant alfalfa is, what clover looks like, and so on. This sort of background knowledge has been taken for granted in the past. Consequently, I have endeavored to provide more agronomic information about the sources of feedstuffs than might usually be the case.

A series of questions and study guides follows each chapter. These instructional materials are intended to aid students in comprehending the text. Some of the questions “pull things together” so that students are encouraged to think and develop a rational answer. In some cases, the answer *per se* is not in the text, but students should be able to synthesize a reasonable answer from the information given. In other cases, there is no “right” answer; these questions are intended to make students think critically about issues and formulate opinions, using the background gained from the text. They should provide a good starting point for classroom discussions.

The treatment leans more heavily toward the discussion of properties of feedstuffs, with a less detailed consideration of feeding practices. The objective of Part II (Applied Nutrition) is to provide the student with some background on the feeding requirements of each of the major species. For specialists and professional nutritionists, more detailed sources, such as the NRC publications, should be consulted. The wide coverage of species, including fish, zoo animals, and wildlife, is probably unique in a text of this type. Consideration is given to minor species to a greater extent than might be warranted from an economic viewpoint. My reasoning is that it is much easier for the reader to find information in other sources on dairy cattle than on ostriches, for example. This book will provide basic information and access to the literature for most species that students and practitioners of animal and poultry nutrition are likely to encounter.

Later chapters build on earlier ones. Topics such as essential amino acids, omega-3 fatty acids, etc. are introduced in the early chapters and encountered again later. It is intended that appreciation for different nutrients and feedstuffs will be enhanced when they are encountered several times in different contexts. I hope that by using this approach, students can learn and gain increased understanding without necessarily realizing it at the time. It is intended that there be several layers of depth so that, according to individual needs, students can achieve different levels of understanding as is appropriate.

I have found that a very useful teaching aid to accompany this text is a student subscription to Feedstuffs magazine. Inexpensive student subscriptions for a term or semester are available. I provide a weekly assignment from the current issue of Feedstuffs. Throughout the term, many of the topics covered in class are encountered in Feedstuffs. I draw attention to these by a selection of questions from each issue. This gives students an appreciation that what we discuss in class really has “real-world” application and reinforces material presented in lectures and the text.

Many thanks to students and colleagues who have made suggestions and comments, many of which have been incorporated into the new edition.

Peter R. Cheeke

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