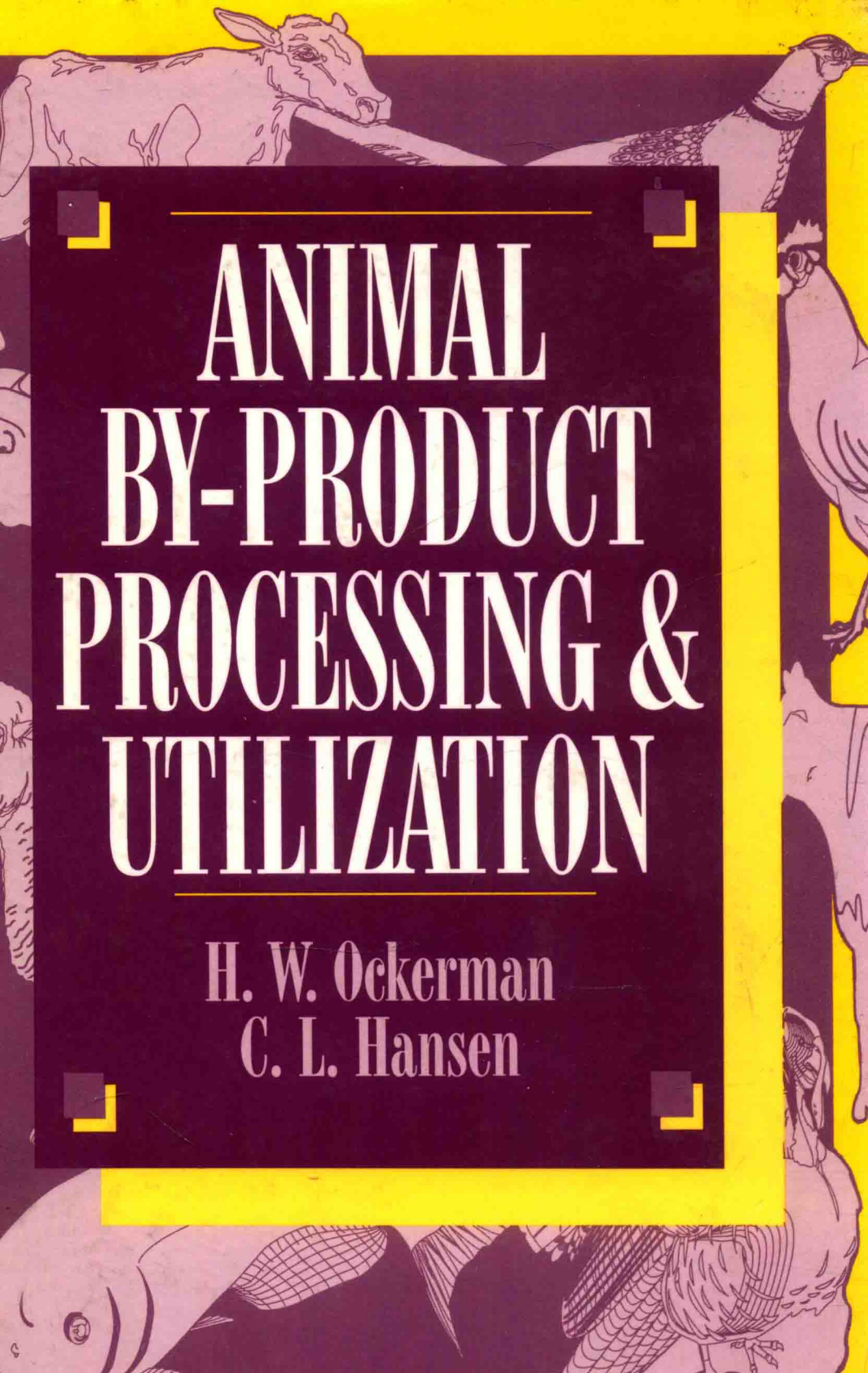

ANIMAL BY-PRODUCT PROCESSING & UTILIZATION

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TECHNOMIC PUBLISHING CO., INC.
LANCASTER · BASEL

Animal By-Product Processing and Utilization
a**TECHNOMIC**publication

Technomic Publishing Company, Inc.
851 New Holland Avenue, Box 3535
Lancaster, Pennsylvania 17604 U.S.A.

Printed in the United States of America
10 9 8 7 6 5 4 3 2 1

Main entry under title:
Animal By-Product Processing and Utilization

A Technomic Publishing Company book
Bibliography: p.
Includes index p. 511

Library of Congress Catalog Card No. 99-64544
ISBN No. 1-56676-777-6

ANIMAL BY-PRODUCT PROCESSING & UTILIZATION

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To Frances J. Ockerman and Joyce D. Hansen

THE animal by-product segment of the food-processing industry has been a remarkable economic achievement and public health phenomena. Nevertheless, published information in the area of animal by-product processing and utilization is limited. The forerunner of this book, *Animal By-Product Processing,* published in 1988 (translated into Spanish in 1994), is the most quoted book on the topic, but it has been out of print for several years. Prior to this publication, a 1927 book was the standard reference source. The most recent book, *The Original Recyclers* (1996) by Don Franco and Winfield Swanson, covers primarily rendering. The scientific journal literature, too, is limited, although material on this topic increasingly can be found on the Internet. Clearly, changes in the industry, the lack of up-to-date information, and the scattered nature of sources make a new, comprehensive treatment of the subject appropriate at this time.

A unique feature of the current book is that it brings together, in one place, information on the entire field of animal by-product processing and utilization. We have incorporated new and updated information—both published and unpublished—made available since 1988 throughout this book. Chapter sections have been revised with information of current importance. Particular attention has been paid to concerns over new animal diseases that might be transferred by feeding low-temperature rendered products and to new precautions for the rendering industry.

The book will be useful for anyone interested in by-product processes or by-product utilization, individuals interested in recycling, people interested in a classic example of reutilization of valuable material, and those involved in the health area who are interested in disease prevention.

The increased economic squeeze on animal processors, increased emphasis on pollution, the energy crisis, and competition from man-made items will challenge the by-products industry in the foreseeable future. However, considering the track record already established, it is reasonable to expect that innovation will continue. Any industry that turns waste into valuable products and reduces pollution ought to be applauded.

Trade association and industry personnel were extremely helpful in sharing information with the authors (see references listed). Dr. Vern R. Cahill of the Ohio State University and Dr. Divakaran of the Oceanic Institute, Waimanald, Hawaii, were also helpful consultants and proofreaders. The authors would appreciate additional information about this varied industry for their files and in case a revision of this text is undertaken in the future.

HERBERT OCKERMAN
CONLY HANSEN

CHAPTER 1

Introduction and History of Processing Animal By-products

INTRODUCTION

ANIMALS are grown and slaughtered to provide nutritious meat for humans, and without this utilization, few of what we consider "meat" animals would be allowed by Homo sapiens to exist except as examples of species in zoos. As the economic stature of a country or race increases, there is usually a shift in its diet and nutrition to include a greater percentage of tasty, well-balanced protein from animal sources. With this consumption of more well-balanced protein from meat, peoples' size (particularly height) usually tends to increase.

With all of the natural advantages of animal food products, there still remains a great quantity, often in excess of 40%, of animal by-products that sometimes have rather unusual physical and chemical characteristics that are not part of the normally consumed steaks and roasts. The efficient and economical utilization of these edible or inedible products is the subject of this book.

The quantity of animal by-products available for utilization can be estimated by subtracting the dressing percentage (see Table 1.1) from 100. This large quantity of material can then be increased by the quantity of fat and bone that traditionally remains with the carcass at the slaughter stage; therefore, it is obvious that tremendous tonnage (estimated at 30 million tons; Franco and Swanson, 1996) of this material is involved and, if not utilized, is a tremendous pollution and health problem.

The economics of the world's meat industry insist that animal by-products be utilized so that the livestock industry can stay economically competitive with vegetable protein sources. If animal by-products are not effectively utilized, of course, a valuable source

Table 1.1. Dressing Percentage (carcass weight/live weight × 100), When Subtracted from 100%, Will Give an Estimate of the Quantity of Noncarcass By-Products.

U.S. Grades	Dressing Percentages	
	Range	Average
Cattle		
Prime	62–67	64
Choice	59–65	62
Good or select	58–62	60
Standard	55–60	57
Commercial	54–62	57
Utility	49–57	53
Cutter	45–54	49
Canner	40–48	45
Calves and veal (hide off)		
Prime	59–65	62
Choice	56–60	58
Good	52–57	55
Standard	47–54	51
Utility	40–48	46
Lambs (wooled)		
Prime	47–55	51
Choice	45–52	49
Good	43–49	47
Utility	41–47	45
Cull	40–45	42
Sheep (excludes yearlings)		
Choice	49–54	52
Good	47–52	49
Utility	44–48	46
Cull	40–46	43
Barrow and gilt (ham facings, leaf fat, kidneys, and head removed)		
U.S. No. 1	68–72	70
U.S. No. 2	69–73	71
U.S. No. 3	70–74	72
U.S. No. 4	71–75	73
Utility	67–71	69