

Flavor of Dairy Products

The paper used in this publication meets the minimum requirements of American National Standard for Information Sciences—Permanence of Paper for Printed Library Materials, ANSI Z39.48–1984.

ISBN: 978-0-8412-3968-5 (OP)

ISBN: 978-1-7138-8952-6 (pod)

Copyright © 2007 American Chemical Society

Distributed by Oxford University Press

All Rights Reserved. Reprographic copying beyond that permitted by Sections 107 or 108 of the U.S. Copyright Act is allowed for internal use only, provided that a per-chapter fee of \$36.50 plus \$0.75 per page is paid to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, USA. Republication or reproduction for sale of pages in this book is permitted only under license from ACS. Direct these and other permission requests to ACS Copyright Office, Publications Division, 1155 16th Street, N.W., Washington, DC 20036.

The citation of trade names and/or names of manufacturers in this publication is not to be construed as an endorsement or as approval by ACS of the commercial products or services referenced herein; nor should the mere reference herein to any drawing, specification, chemical process, or other data be regarded as a license or as a conveyance of any right or permission to the holder, reader, or any other person or corporation, to manufacture, reproduce, use, or sell any patented invention or copyrighted work that may in any way be related thereto. Registered names, trademarks, etc., used in this publication, even without specific indication thereof, are not to be considered unprotected by law.

PRINTED IN THE UNITED STATES OF AMERICA

Contents

Preface.....xi

Overview

1. **Sixty Years of Research Associated with Flavor in Dairy Foods.....3**
W. James (Jim) Harper

Chemistry and Analysis

2. **Flavor Analysis of Dairy Products.....23**
Robert J. McGorin
3. **Establishing Links between Sensory and Instrumental Analyses
of Dairy Flavors: Example Cheddar Cheese.....51**
MaryAnne Drake, Keith R. Cadwallader,
and Mary E. Carunchia Whetstone
4. **Application of Solid-Phase Microextraction Gas
Chromatography–Mass Spectrometry for Flavor Analysis
of Cheese-Based Products.....79**
Raymond T. Marsili
5. **The Influence of Texture on Aroma Release and Perception
Related to Dairy Products.....93**
Jennifer Mei and Gary Reineccius
6. **Streamlined Analysis of Short-, Medium-, and Long-Chain
Free Fatty Acids in Dairy Products.....111**
Keith R. Cadwallader, Tanoj. K. Singh, and John P. Jerrell

7. **From Pasture to Cheese: Changes in Terpene Composition.....123**
Hedwig Schlichtherle-Cerny, Miroslava I. Imhof,
Estrella Fernández García, and Jacques O. Bosset
8. **Volatile Sulfur Compounds in Cheddar Cheese Determined
by Headspace Solid-Phase Microextraction–Gas
Chromatography–PFPD.....135**
Michael C. Qian and Helen M. Burbank
9. **Origins of Cheese Flavor.....155**
Michael H. Tunick

Biochemical Aspects

10. **Biochemistry of Cheese Flavor Development: Insights
from Genomic Studies of Lactic Acid Bacteria.....177**
Jeffery R. Broadbent and James L. Steele
11. **Proteolytic Enzymes of Lactic Acid Bacteria and Their
Influence on Bitterness in Bacterial-Ripened Cheeses.....193**
Jeffery R. Broadbent and James L. Steele
12. **Volatile Sulfur-Containing Compounds from Methionine
Metabolism in Genetically Modified *Lactobacillus helveticus*
CNRZ32 Strains.....205**
Scott A. Rankin, Dattatreya S. Banavara, Ed S. Mooberry,
James L. Steele, Jeffery R. Broadbent, and Joanne E. Hughes

Processing and Storage Effects

13. **The Flavor and Flavor Stability of Skim and Whole Milk
Powders.....217**
Mary E. Carunchia Whetstine and MaryAnne Drake
14. **Effect of Processing Technology and Phenolic Chemistry
on Ultra-High Temperature Bovine Milk Flavor Quality.....253**
Devin G. Peterson, Paula M. Colahan-Sederstrom,
and Rajesh V. Potineni

Indexes

Author Index.....	263
Subject Index.....	265