Woodhead Publishing Series in Food Science, Technology and Nutrition

A Handbook for Sensory and Consumer-Driven New Product Development

Innovative Technologies for the Food and Beverage Industry

Maurice G. O'Sullivan
Contents

Part I
Sensory Methods

1. Difference Methods
   Introduction
   The A – Not A Method
   The Paired Comparison Test and the 2-AFC (Alternative Forced Choice) Test
   The Duo-Trio Test
   The Triangle Test and the 3-AFC Test
   The Ranking Test
   The Tetrad Test
   Other Tests
   References

2. Descriptive Methods
   Introduction
   Environment and Panel Conditions
   The Panellist
   Sample Presentation Order
   Panel Screening
   Case Study – Demonstration of Quantitative Descriptive Analysis. The Descriptive Profile Training Process
   Initial Vocabulary Development
   Data Analysis During Vocabulary Development
   Protocol for the Examination of the Effectiveness of Vocabulary Development
   Method for Quantification of Discriminative Ability
   The Descriptor Leverage Method
   Development of Preliminary List of Terms
   Examination of the Effectiveness of Vocabulary Development
   Quantification of Discriminative Ability
Part II
Product Quality, Development and Optimisation

6. Shelf Life and Sensory Quality of Foods and Beverages
   Introduction
   Microbial Loading
   Sensory Shelf Life Testing
   Experimental Design and Sample Handling
   Sensory Shelf Life Methods
   Colour and Sensory Shelf Life
   Texture and Sensory Shelf Life
   Shelf Life and Flavour Profile Changes
   Chemical Analysis
   Accelerated Storage Tests
   References

7. Packaging Technologies for Maintaining Sensory Quality
   Introduction
   Packaging Materials
   Modified Atmosphere Packaging
   Low O₂ Modified Atmosphere Packaging
   Vacuum Packaging
   Active and Intelligent Packaging
   Future Trends in Packaging
   References

8. Instrumental Assessment of the Sensory Quality of Food and Beverage Products
   Introduction
   Instrumental Methods of Colour Analysis
9. Nutritionally Optimised Low Fat Foods

Introduction 177
Fat Replacers 178
Fat Substitutes 178
Fat Mimetics 179
Meat Products 182
Dairy Products 186
Confectionary Products 188
Salad Dressing and Sauces 190
References 191

10. Sensory and Consumer-Led Innovative Product Development — From Inception to the Shelf (Current and Future Methodologies) 197

Introduction 197
New Product Development Teams — Managed and Resourced for Success 198
R&D Process Stages 200
Ideation 201
Project Preplanning 202
Validation of Proof of Concept 203
Regulatory Guidelines 204
Least Cost Formulation 205
Technological Capability 205
Contingency of Supply 207
Copycatting and Reverse Engineering 208
Line Extension, Brand Extension and Cannibalisation! 208
Process Optimisation and Upscaling 209
Marketing 209
Pre- and Postapproval — Shelf Life Testing 209
Technological Developments, Internet Testing, Immersive Technology, Mobile Applications and Eye Tracking 210
Sensory Methodology — Consumer Evaluation, Focus Groups, Validation, Ideal Profiling 212
Case Studies 214
References 218
Part III
Case Studies: Sensory and Consumer Driven NPD in Action

11. Sensory Properties Affecting Meat and Poultry Quality

   Introduction 225
   Microbiological Stability 226
   Factors Affecting Meat Colour 228
   Factors Affecting Meat Flavour 230
   Factors Affecting Meat Tenderness 232
   Salt and Nitrate Reduction Strategies in Processed Meats 233
   Salt in Processed Meats 233
   Nitrate and Nitrite in Processed Meats 237
   Human Health Impact of Nitrate and Nitrite 238
   Innovative Packaging (Active, Intelligent) of Meat Products 239
   Evaluating the Shelf Life of Meat and Poultry — Sensory Analysis 240
   Case Study — Sensory Profiling (Quantitative Descriptive Analysis) of Pork Meat Samples Over Different Time Points (Days, Shelf Life) and Correlation With Physicochemical Data 242
   Training and Profiling 243
   Monte Carlo Power Estimation of Experimental Design 243
   Data Analysis 243
   Results and Discussion 246
   References 249

12. Sensory Properties of Dairy Products 259

   Introduction 259
   Sensory Properties of Milk 262
   Sensory Properties of Milk Powder 263
   Sensory Properties of Butter 264
   Sensory Properties of Yoghurt 266
   Sensory Properties of Ice Cream 267
   Sensory Properties of Cheese 268
   Case Study: Sensory Quality of Unheated and Heated Mozzarella 272
   References 275

13. Sensory Properties of Beverage Products (Alcoholic and Nonalcoholic) 281

   Introduction 281
   Sensory Properties of Soft Drinks and Fruit Juices 282
   Sensory Properties of Coffee 283
   Sensory Properties of Cream Liqueurs 287
   Sensory Properties of Wine 289
14. Sensory Properties of Bakery and Confectionary Products

Introduction
Sensory Properties of Biscuits and Cookies
Sensory Properties of Cakes and Muffins
Sensory Properties of Chocolate
Sensory Properties of Sugar
Calorie Reduction Strategies
Gluten-Free Products
Shelf Life — Microbiological Spoilage, Staling and Oxidative Stability
Antistaling Strategies
References