

Contents

<i>Contributors</i>	<i>ix</i>
<i>Preface</i>	<i>xiii</i>
1. Lipids and nutrition security	1
Tonderayi M. Matsungu, Linda P. Siziba	
1.1 Introduction and background	2
1.2 Definition of terms	4
1.3 Types of lipids	5
1.4 Lipids in human nutrition	13
1.5 Recommended intakes of total fat and FAs	17
1.6 Innovative technologies in improving intake and EFA profiles of foods	21
1.7 Socio-economic factors affecting consumption of EFAs and implication on food and nutrition security	31
1.8 Policy recommendations on dietary fat intake	33
1.9 Conclusions and future directions	34
References	35
Further reading	43
2. Bioavailability and metabolism of dietary lipids	45
Marie-Caroline Michalski, Leslie Couëdelo, Armelle Penhoat, Carole Vaysse, Cécile Vors	
2.1 Introduction	46
2.2 Lipid digestion in the gastrointestinal tract	46
2.3 Lipid absorption through the enterocytes	50
2.4 Impact of molecular lipid structures on absorption and bioavailability	55
2.5 Effect of the supramolecular/emulsified structures of lipids on digestion, absorption and postprandial metabolism/lipemia	63
2.6 Impact of the food matrix on lipid bioavailability and postprandial lipemia	74
2.7 Conclusion	78
References	79
3. Nutrigenomics of lipid supplementation in ruminants and pigs	93
Marcel Amills, Alex Clop, Cristina Óvilo	
3.1 A brief introduction to nutrigenomics in livestock species	93
3.2 Molecular techniques can provide fundamental information about the interplay between nutrition and gene expression	95

3.3 Effects of lipid supplementation on the mammary gland gene expression patterns of ruminants	97
3.4 Effects of lipid supplementation on the skeletal muscle gene expression patterns of ruminants	106
3.5 Pig production, nutrition, and genomics	108
3.6 Fat deposition and lipid metabolism in pigs	109
3.7 Diet supplementation with lipids and its effects on the tissue composition of pigs	113
3.8 Diet supplementation with lipids and its effects on the gene expression patterns of pigs	115
3.9 Perspectives and challenges	119
References	121
 4. Valorization of lipid by-products	 133
Ana P. Carvalho, Manuela M. Moreira, Cristina Delerue-Matos, Ana M. Gomes, Ana C. Freitas, Clara Grosso	
4.1 Introduction	133
4.2 By-products from marine sources	134
4.3 By-products from meat processing	144
4.4 By-products from plant sources	148
4.5 Conclusions	166
Acknowledgments	167
References	167
 5. Microalgae as a source of edible oils	 175
Jelena Helene Cvejic, Antonio Luca Langellotti, Hubert Bonnefond, Vito Verardo, Olivier Bernard	
5.1 Introduction	175
5.2 Microalgae biology and production	177
5.3 Insight in lipid metabolism of microalgae	183
5.4 Progress in lipid accumulation and productivity	187
5.5 Microalgae oil extraction and purification	189
5.6 Economic sustainability	193
5.7 Environmental sustainability	195
5.8 Health benefit, safety, and bioavailability of microalgae oils	198
5.9 Conclusion	201
Acknowledgment	202
References	202
Further reading	210

6. Refining of edible oils	213
Sook Chin Chew, Kar Lin Nyam	
6.1 Introduction	213
6.2 General composition of edible oil	214
6.3 Chemical refining	220
6.4 Physical refining	232
6.5 Short-path distillation	233
6.6 Effects of refining on minor components of vegetable oils	233
6.7 Effects of refining on oxidative stability of vegetable oils	237
6.8 Conclusion	238
References	238
Further reading	241
7. Lipid oxidation in food	243
Mickaël Laguerre, Antoine Bily, Simona Birtić	
7.1 Introduction	243
7.2 A chemical portrait of lipid oxidation	244
7.3 Painting an alternative portrait of lipid oxidation	269
7.4 Conclusion	281
References	283
8. Structured lipids: Synthesis, health effects, and nutraceutical applications	289
Wissam Zam	
8.1 Introduction	289
8.2 Health benefits of SLs	291
8.3 Commercial products examples of structured lipids	300
8.4 Absorption of structured lipids	307
8.5 Synthesis of structured lipids	308
8.6 Nutraceutical and functional applications of structured lipids	312
8.7 Cocoa butter alternatives	315
8.8 Conclusion	318
References	319
9. Structured lipids intended for infant nutrition	329
Semih Ötleş, Vasfiye Hazal Özyurt	
9.1 Introduction	329
9.2 The production methods of structured lipids	330
9.3 The health effect of structured lipids	333
9.4 Commercial products examples of structured lipids	333

9.5 Human milk fats	334
9.6 Products involving human milk fat substitutes	335
9.7 Conclusion	338
References	338
<i>Index</i>	343