

Contents

Contributors	xi
Preface	xiii
<hr/>	
1 Milk: an overview	1
<i>Pat F. Fox</i>	
Abstract	1
Introduction	2
Evolution of mammals and lactation	3
Utilization of milk	7
Composition of milk	7
Milk constituents	8
Conclusions	43
References	44
2 The comparative genomics of tammar wallaby and Cape fur seal lactation models to examine function of milk proteins	55
<i>Julie A. Sharp, Matthew Digby, Christophe Lefevre, Sonia Mailer, Elie Khalil, Denijal Topcic, Aurelie Auguste, Joly Kwek, Amelia J. Brennan, Mary Familiar and Kevin R. Nicholas</i>	
Abstract	55
Introduction	56
The tammar wallaby (<i>Macropus eugenii</i>)	58
The Cape fur seal (<i>Arctocephalus pusillus pusillus</i>)	70
Conclusions	75
References	76
3 Significance, origin and function of bovine milk proteins: the biological implications of manipulation or modification	81
<i>P. A. Sheehy, P. Williamson, J. A. Sharp, K. Menzies, C. Lefevre, M. Digby, K. R. Nicholas and P.C. Wynn</i>	
Abstract	81
Introduction	82
Milk genomics: a contemporary approach to milk composition	82
Advances in bovine genome science	83
Comparative milk genomics	85
Origins of milk proteins	86

	Constraints and opportunities for evolution or manipulation of bovine milk proteins.....	88
	Conclusions.....	100
	References.....	100
4	Post-translational modifications of caseins	107
	<i>John W. Holland</i>	
	Abstract.....	107
	Introduction.....	107
	Bovine casein.....	108
	Sources and functional significance of κ -casein heterogeneity.....	117
	Conclusions.....	124
	References.....	124
5	Casein micelle structure and stability	133
	<i>David S. Horne</i>	
	Abstract.....	133
	Introduction.....	133
	Casein primary structure and interactions.....	135
	Casein micelle properties.....	140
	Models of casein micelle structure.....	141
	Conclusions.....	156
	References.....	157
6	Structure and stability of whey proteins	163
	<i>Patrick B. Edwards, Lawrence K. Creamer and Geoffrey B. Jameson</i>	
	Abstract.....	163
	Introduction.....	163
	Bovine β -lactoglobulin.....	164
	α -Lactalbumin.....	177
	Serum albumin.....	181
	Immunoglobulins.....	184
	Lactoferrin.....	185
	Conclusions.....	189
	Acknowledgments.....	189
	References.....	190
7	High-pressure-induced interactions involving whey proteins	205
	<i>Hasmukh A. Patel and Lawrence K. Creamer</i>	
	Abstract.....	205
	Introduction.....	205
	Characterization of heat- and pressure-induced changes to proteins.....	207
	Effects of high pressure on milk proteins.....	209
	Denaturation and aggregation of pure whey proteins in model systems ...	211
	Commercial whey protein solutions.....	216
	Pressure-induced gelation of whey proteins.....	219
	HPP-induced changes in milk.....	221
	Conclusions.....	226
	Acknowledgments.....	227
	References.....	227

8	The whey proteins in milk: thermal denaturation, physical interactions and effects on the functional properties of milk	239
	<i>Skelte G. Anema</i>	
	Abstract	239
	Introduction	240
	The casein micelle	241
	The heat treatment of milk	242
	Relationships between denaturation/interactions of the whey proteins in heated milk and the functional properties of milk products	263
	Conclusions.....	272
	References	273
9	Effects of drying on milk proteins	283
	<i>Pierre Schuck</i>	
	Abstract	283
	Introduction	283
	World dairy powder situation	284
	Properties of spray-dried milk products.....	287
	Principles of spray drying.....	287
	Drying of proteins	291
	Rehydration of protein powders	297
	Conclusions.....	301
	References	302
10	Changes in milk proteins during storage of dry powders	307
	<i>Kerianne Higgs and Mike Boland</i>	
	Abstract	307
	Introduction	307
	The formation of Maillard and pre-Maillard compounds	309
	Formation of isopeptide bonds.....	313
	Amino acids other than lysine.....	314
	Implications for nutritional value of milk proteins.....	315
	Product-specific storage trials.....	318
	Conclusions.....	319
	References	320
11	Interactions and functionality of milk proteins in food emulsions	321
	<i>Harjinder Singh and Aiqian Ye</i>	
	Abstract	321
	Introduction	322
	Adsorption of milk proteins during the formation of emulsions.....	323
	Stability of milk-protein-based emulsions	328
	Heat-induced changes in milk-protein-based emulsions	332
	Pressure-induced changes in milk-protein-based emulsions	335
	Milk protein hydrolysates and oil-in-water emulsions	336
	Lactoferrin-based oil-in-water emulsions	338
	Conclusions.....	339
	References	340

12	Milk protein–polysaccharide interactions	347
	<i>Kelvin K. T. Goh, Anwesha Sarkar and Harjinder Singh</i>	
	Abstract	347
	Introduction	347
	Mixing behavior of biopolymers.....	348
	Phase diagram	351
	Nature of interactions in protein–polysaccharide systems.....	352
	Milk protein–polysaccharide interactions	355
	Rheological properties and microstructures of protein–polysaccharide systems	355
	Conclusions.....	367
	References	368
13	Interactions between milk proteins and micronutrients	377
	<i>T. Considine and J. Flanagan</i>	
	Abstract	377
	Introduction	377
	Interaction between milk proteins and micronutrients	378
	Effect of processing on milk protein structure.....	391
	Conclusions.....	396
	References	396
14	Model food systems and protein functionality	409
	<i>W. James Harper</i>	
	Abstract	409
	Introduction	410
	Protein functionality in foods	411
	Role of interactions in determining food characteristics	411
	Processing effects.....	413
	Uses of model food systems	414
	Applications of model food systems.....	416
	Limitations of model food systems.....	421
	Conclusions.....	421
	References	422
15	Sensory properties of dairy proteins	429
	<i>M. A. Drake, R. E. Miracle and J. M. Wright</i>	
	Abstract	429
	Introduction	429
	Sensory analysis	430
	Whey proteins	431
	Milk proteins	441
	Caseins and hydrolysates.....	442
	Flavor binding.....	445
	Conclusions.....	445
	Acknowledgments.....	445
	References	445

16 Milk protein gels	449
<i>John A. Lucey</i>	
Abstract	449
Introduction	449
Rennet-induced gels	450
Acid-induced milk gels	458
Whey protein gels	464
Mixed gels made with rennet and acid	471
Conclusions	472
References	472
17 Milk proteins: a cornucopia for developing functional foods	483
<i>Paul J. Moughan</i>	
Abstract	483
Introduction	484
Functional foods	485
Milk proteins as a source of amino acids	487
Milk proteins as a source of bioactive peptides	493
Conclusions	496
References	496
18 Milk proteins: the future	501
<i>Mike Boland</i>	
Abstract	501
Introduction	501
Global issues for food	501
Consumer demands and trends for food and ingredients	504
New technologies and their possible effect on milk protein ingredients and products	507
Conclusions	509
References	509
<hr/>	
Index	513
Series list	533