CONTENTS

FOREWORD		v	
INT	RODUC	CTION	x i
1.	LIO	UID MILK PRODUCTS	I
1.	1.1	Definitions	1
	1.2	Initial Microflora	,
	1.3	Processing and its Effects on the Microflora	3
	1.3	Other Methods of Treating Milk	7
	1.5	Filling and Packaging	8
	1.6	Spoilage	8
	1.7	Pathogens: Growth and Survival	10
	1.8	References	15
2.	CON	ICENTRATED AND DRIED MILK PRODUCTS	21
	2.1	Definitions	21
	2.2	Initial Microflora	22
	2.3	Processing and its Effects on the Microflora	22
	2.4	Spoilage	28
	2.5	Pathogens: Growth and Survival	30
	2.6	References	33
3.	CREAM		37
	3.1	Definitions	37
	3.2	Initial Microflora	38
	3.3	Processing and its Effects on the Microflora	38
	3.4	Processing of Other Creams	41
	3.5	Spoilage	42
	3.6	Pathogens: Growth and Survival	43
	3.7	References	46
4.	BUTTER AND DAIRY SPREADS		49
	4.1	Definitions	49
	4.2	Initial Microflora	49
	4.3	Processing and its Effects on the Mieroflora	50
	4.4	Spoilage	55
	4.5	Pathogens: Growth and Survival	56
	4.6	References	57
5.	CHEESE		61
	5.1	Definitions	61
	5.2	Initial Microflora	62
	5.3	Processing and its Effects on the Microflora	62
	5.4	Processed Cheese	67
	5.5	Value-added Cheese	67
	5.6	Spoilage	67

	5.7	Pathogens: Growth and Survival	69	
	5.8	References	74	
6.	FERMENTED MILKS			
	6.1	Definitions	77 77	
	6.2	Lactic Fermentations	77	
	6.3	Yeast - Lactic Fermentations	80	
	6.4	Mould - Laetic Fermentations	80	
	6.5	Initial Microflora	81	
	6.6	Processing and its Effects on the Microflora	81	
	6.7	Probiotic Products	84	
	6.8	Spoilage	85	
	6.9	Pathogens: Growth and Survival	86	
	6.10	Probiotic Products	89	
	6.11	References	89	
7.	ICE (ICE CREAM AND RELATED PRODUCTS 91		
••	7.1	Definitions	91	
	7.2	Initial Microflora	92	
	7.3	Processing and its Effects on the Microflora	92	
	7.4	Distribution	98	
	7.5	Spoilage	98	
	7.6	Pathogens: Growth and Survival	99	
	7.7	Toxins	101	
	7.8	References	101	
8.	ЦАС	HACCP 103		
ο.	8.1	Introduction	103 103	
	8.2	Definitions	103	
	8.3	- · · · · · · · · · · · · · · · · · · ·		
	8.4	Stages of a HACCP Study Implementation and Review of the HACCP Plan	104 113	
	8.5	References		
	03	References	114	
9.		OOD HYGIENE LEGISLATION	117	
	9.1	Introduction	117	
	9.2	Legislative Structure	118	
	9.3	Regulation (EC) No. 852/2004 on the General Hygiene of Foodstuffs	119	
	9.4	Regulation (EC) No. 853/2004 Laying Down Specific Hygiene Rules for Foo		
		Animal Origin	123	
	9.5 Regulation (EC) No. 854/2004 of the European Parliament and of the Council Laying Down Specific Rules for the Organisation of Official Controls on Products			
		of Animal Origin Intended for Human Consumption	130	
	9.6	Regulation (EC) No. 2073/2005 on Microbiological Criteria for Foodstuffs	130	
	9.7	Food Hygiene (England) Regulations 2006, S.I. 2006 No. 14 (Hygiene		
		requirements specific to the UK)	139	
	9.8	Guidance	141	
	9.9	References	141	
10	PATHOGEN PROFILES 14:			
	10.1	Bacillus cereus	143	
	10.2	Campylobacter spp.	145	
	10.3	Clostridium botulinum	145	
	10.4	Clostridium perfringens	147	
	10.5	Cronobacter (Enterobacter) sakazakii	148	
	10.6	Escherichia coli 0157	149	
	10.7	Listeria spp.	150	
	10.8	Salmonella spo	151	

10.9	Staphylococcus aureus	152
10.10	Yersinia enterocolitica	154
10.11	References	155
CONTACTS		163
INDEX		167

CONTENTS

CONTRIBUTORS		iii	
FO	FOREWORD INTRODUCTION		v
IN1	RODUC	CTION	xi
1.	CHI	1	
	1.1	Definitions	1
	1.2	Initial Microflora	3
	1.3	Processing and its Effects on the Microflora	5
	1.4	Spoilage	9
	1.5	Factors Affecting Fresh Fish Spoilage	12
	1.6	Pathogens: Growth and Survival	15
	1.7	Published Microbiological Criteria	19
	1.8	References	20
	1.9	Further Reading	24
2.	CHI	LLED AND FROZEN PREPARED FISH PRODUCTS	27
	2.1	Introduction	27
	2.2	Definitions	28
	2.3	Initial Microflora	31
	2.4	Processing and its Effects on the Microflora	32
	2.5	Spoilage	43
	2.6	Pathogens: Growth and Survival	45
	2.7	Published Microbiological Criteria	47
	2.8	References	49
3.	MOLLUSCAN SHELLFISH		53
	3.1	Definitions	53
	3.2	Initial Microflora	59
	3.3	Processing and its Effects on the Microflora	60
	3.4	Spoilage	65
	3.5	Pathogens: Growth and Survival	66
	3.6	Published Microbiological Criteria	70
	3.7	References	71
	3.8	Further Reading	77
4.	CRUSTACEAN SHELLFISH		79
	4.1	Definitions	79
	4.2	Initial Microflora	80
	4.3	Processing and its Effects on the Microflora	81
	4.4	Spoilage	83
	4.5	Pathogens: Growth and Survival	84
	4.6	Published Microbiological Critera	87
	4.7	References	89
	4.8	Further Reading	92

5.	CURED, SMOKED AND DRIED FISH			
	5.1	Definitions	93	
	5.2	Initial Microflora	95	
	5.3	Processing and its Effects on the Microflora	96	
	5.4	Spoilage	108	
	5.5	Pathogens: Growth and Survival	113	
	5.6	Published Microbiological Criteria	116	
	5.7	References	117	
	5.8	Further Reading	120	
6.	FERN	MENTED FISH	123	
	6.1	Definitions	123	
	6.2	Initial Microflora	126	
	6.3	Processing and its Effects on the Microflora	127	
	6.4	Spoilage	135	
	6.5	Pathogens: Growth and Survival	136	
	6.6	References	137	
	6.7	Further Reading	140	
7.	FISH	AND SHELLFISH TOXINS	141	
	7.1	Introduction	141	
	7.2	Paralytic Shellfish Poisoning (PSP) Toxins	142	
	7.3	Tetrodotoxin	144	
	7.4	Amnesic Shellfish Poisoning (ASP) Toxins	146	
	7.5	Diarrhetic Shellfish Poisoning (DSP) Toxins	148	
	7.6	Lipophilic Shellfish Toxins (LST)	151	
	7.7	Neurotoxin Shellfish Poisoning (NSP) Toxins	153	
	7.8	Ciguatoxins	155	
	7.9	Azaspiracids	158	
	7.10	Cyclic Imines	160	
	7.11	Conclusion	165	
	7.12	References	166	
8.	HAC	CP IN FISH AND SEAFOOD PRODUCT MANUFACTURE	175	
-	8.1	Introduction	175	
	8.2	Definitions	176	
	8.3	Stages of a HACCP Study	177	
	8.4	Implementation and Review of the HACCP Plan	184	
	8.5	References	186	
9.	EU FOOD HYGIENE LEGISLATION			
	9.1	Introduction	189 189	
	9.2	Legislative Structure	190	
	9.3	Regulation (EC) No. 852/2004 on the General Hygiene of Foodstuffs	191	
	9.4	Regulation (EC) No. 853/2004 Laying Down Specific Hygiene Rules for Foo		
	0.5	Animal Origin Resolution (RC) No. 854/2004 of the European Berliament and of the Council		
	9.5	Regulation (EC) No. 854/2004 of the European Parliament and of the Counci Laying Down Specific Rules for the Organisation of Official Controls on Pro-		
		of Animal Origin Intended for Human Consumption	212	
	9.6	Regulation (EC) No. 2073/2005 on Microbiological Criteria for Foodstuffs	214	
	9.7	Food Hygiene (England) Regulations 2006, S.I. 2006 No. 14 (Hygiene		
		requirements specific to the UK)	221	
	9.8	Guidance	222	
	9.9	Other Relevant Legislation	223	
	9.10	Further Reading	223	

10	PATHOGEN PROFILES		225
	10.1	Aeromonas spp.	225
	10.2	Clostridium botulinum	226
	10.3	Clostridium perfringens	227
	10.4	Listeria spp.	229
	10.5	Plesiomonas	230
	10.6	Salmonella spp.	230
	10.7	Staphylococcus aureus	232
	10.8	Vibrio cholerae	233
	10.9	Vibrio parahaemolyticus	234
	10.10	Vibrio vulnificus	235
	10.11	References	236
CONTACTS			241
INDI	ΞX		247

	NTRIBU EWOR		iii v
INT	RODUC	CTION ,	ix
1.	CHILLED AND FROZEN RAW MEAT, POULTRY AND THEIR PRODUCTS		
	1.1	Definitions	1
	1.2	Initial Microflora	3
	1.3	Processing and its Effects on the Microflora	7
	1.4	Spoilage	24
	1.5	Pathogens: Growth and Survival	30
	1.6	Published Microbiological Criteria	37
	1.7	References	39
	1.8	Further Reading	44
2.	COC	KED MEATS, POULTRY, AND THEIR PRODUCTS	53
	2.1	Introduction	53
	2.2	Definitions	53
	2.3	Initial Microflora	54
	2.4	Processing and its Effects on the Microflora	54
	2.5	Spoilage	61
	2.6	Pathogens: Growth and Survival	65
	2.7	Published Microbiological Criteria	72
	2.8	References	74
	2.9	Further Reading	78
3.	DRII	ED MEATS, POULTRY AND RELATED PRODUCTS	83
	3.1	Historical Data	83
	3.2	Types and Classification of Dried Meats	83
	3.3	Initial Microflora	84
	3.4	Processing and its Effects on the Microflora	85
	3.5	Spoilage	88
	3.6	Pathogens: Growth and Survival	90
	3.7	References	95
4.	CURED MEATS AND POULTRY, INCLUDING COOKED CURED MEATS		101
	4.1	Definitions	101
	4.2	Initial Microflora	102
	4.3	Processing and its Effects on the Microflora	103
	4.4	Spoilage	109
	4.5	Pathogens: Growth and Survival	112
	4.6	References	116
5.	FER	MENTED MEATS	129
	5.1	Historical Data	129
	5.2	Types of Fermented Meats	129

	5.3	Initial Microflora	131
	5.4	Processing and its Effects on the Microflora	135
	5.5	Spoilage	137
	5.6	Pathogens: Growth and Survival	139
	5.7	References	146
6.	EGGS		157
	6.1	Definitions	157
	6.2	Properties of the Egg	158
	6.3	Initial Microflora	159
	6.4	Processing and its Effects on the Microflora	159
	6.5	Spoilage	167
	6.6	Pathogens: Growth and Survival	170
	6.7	Published Microbiological Criteria	174
	6.8	References	175
	6.9	Further Reading	178
7.	HACC	P IN MEAT AND MEAT PRODUCT MANUFACTURE	183
	7.1	Introduction	183
	7.2	Definitions	184
	7.3	Stages of a HACCP Study	185
	7.4	Implementation and Review of the HACCP Plan	198
	7.5	References	198
8.	EC FO	OOD HYGIENE LEGISLATION	205
	8.1	Introduction	205
	8.2	Legislative Structure	206
	8.3	Regulation (EC) No. 852/2004 on the General Hygiene of Foodstuffs	207
	8.4	Regulation (EC) No. 853/2004 Laying Down Specific Hygiene Rules for Food	
		of Animal Origin	213
	8.5	Regulation (EC) No. 854/2004 of the European Parliament and of the Council	
		Laying Down Specific Rules for the Organisation of Official Controls on Produc	
		of Animal Origin Intended for Human Consumption	245
	8.6	Regulation (EC) No. 2073/2005 on Microbiological Criteria for Foodstuffs	248
	8.7	Food Hygiene (England) Regulations 2006, S.I. 2006 No. 14 (Hygiene	
		requirements specific to the UK)	258
	8.8	Guidance	259
	8.9	Other Relevant Legislation	259
	8.10	References	260
9.		OGEN PROFILES	263
	9.1	Campylobacter spp.	263
	9.2	Clostridium botulinum	264
	9.3	Clostridium perfringens	266
	9.4	Escherichia coli O157	267
	9.5	Listeria spp.	268
	9.6	Salmonella spp.	269
	9.7	Staphylococcus aureus	271
	9.8	Yersinia spp.	272
	9.9	References	273
CONT	ACTS		279
INDE	x		200