

INDEX

- Achromobacter* spp., in spoilage of cheese 68
 in spoilage of UHT processed milk 10
- Acid buttermilk 79
- Acidophilus milk, production of 77, 79
- Acinetobacter*, in spoilage of processed milk 9
 in spoilage of UHT processed milk 10
- Aeromonas* spp., survival in fermented milks 88
- Aflatoxin M1, in butter 57
 in dried milk 33
- Aflatoxins, in ice cream 103
 in pasteurised milk products 15
- Ageing, in ice cream production 99
- Alcaligenes metacaligenes*, in spoilage of cottage cheese 68
- Alcaligenes*, in spoilage of cheese 68
 in spoilage of processed milk 9
 in spoilage of stored raw milk 3
- Alcaligenes viscolactis*, in spoilage of cottage cheese 68
- Alginates, as stabilisers in ice cream 96-7
- Alternaria, in spoilage of butter 55
 in spoilage of cheese 68
 in spoilage of yoghurt 86
- Antimicrobial factors, natural – in bovine milk 2-3
- Aspergillus*, in spoilage of butter 55
 in spoilage of cheese 68
 in spoilage of yoghurt 86
- Aspergillus niger*, causing discolouration in cheese 69
- Autothermal Thermophilic Aerobic Digester friction process, in production of cream 41
- Bacillus cereus*, as cause of food-poisoning associated with cream 45
 as cause of sweet curdling in cream 42
 as cause of sweet curdling in milk 8
 as contaminant in ice cream 96
 growth and survival in cream 45
 in spoilage of cream 42
 growth and survival in fermented milks 88
 isolated in ice cream 102
 isolated in pasteurised milk 6
 pathogen profile 145-6
- Bacillus coagulans*, in spoilage of sweetened condensed milk 29
 surviving heat processing in cream production 42
- Bacillus licheniformis*, in spoilage of sweetened condensed milk 29
 surviving heat processing in cream production 42
- Bacillus megaterium*, in spoilage of sweetened condensed milk 29
- Bacillus polymyxa*, in spoilage of dairy spreads 56
- Bacillus pumilus*, as contaminant in cream 42
- Bacillus* spp., causing discolouration in cheese 69
 causing outbreaks of food poisoning 14
 growth and survival in dried milk 32
 in butter and dairy spreads 49
 in pasteurised milk products 14
 in spoilage of cheese 68
 in spoilage of condensed milk 28
 in spoilage of UHT processed milk 10
 thermoduric microflora in milk 8
- Bacillus stearothermophilus*, in spoilage of sweetened condensed milk 29
- Bacillus subtilis*, in spoilage of sweetened condensed milk 29
- Bacillus sporothermodurans*, survival in UHT-treated milk 7
- Bacillus sporothermophilus*, as contaminant in cream 42
 in spoilage of evaporated milk 25
- Bacillus subtilis*, surviving heat in processing of cream 42
- Bacterial spoilage, of butter 55
 of cheese 68-9
- Bactofugation, in processing of milk and cheese 7, 63
- Bio yoghurts, production of 79-80
- Bitty cream, caused by *Bacillus cereus* 8, 42
- Botulinum, outbreak associated with cheese 73
 outbreak associated with yoghurt 88
- Bovine milk, composition 1
 initial microflora 1-2
- Brining, in cheese production 66

- Brucella abortus*, presence in cheese 73
Brucella melitensis, presence in cheese 73
 Bulk condensed milk, 21
 processing of 23-4
 Butter 49-59
 initial microflora 49
 packaging of 52
 pasteurisation of 50-1
 processing of 50-1
 production of (Fig.) 50
 ripened cream 51-4
 spoilage of 55
 Buttermilk, traditional or natural, fermentation of 77-8
Campylobacter jejuni enteritis, outbreaks associated with butter 57
Campylobacter spp., in contamination of butter 57
 in pasteurised milk products 11
 in raw milk 10
 pathogen profile 146-7
 Campylobacteriosis, outbreaks caused by pasteurised milk products 11
Candida lipolyticum, in spoilage of bakers' cream 43
 in spoilage of butter 55
Candida pseudotropicalis, in spoilage of cream 43
Candida spp., as contaminant in ice cream 96
 in spoilage of cheese 68
 in spoilage of yoghurt 85
 Carbon dioxide addition, in processing of raw milk 4
 Carboxymethyl cellulose, as stabiliser in ice cream 96-7
 Carrageenan, as stabiliser in ice cream 96-7
 Cassatas, definition 94
 Centrifugal separators, use in production of cream 39-40
 Cheese 61-74
 bacterial spoilage 68-9
 discolouration 69
 growth and survival of pathogens 69-74
 processing 62-7
 production (Fig.) 62
 value-added 67
 Churning, in production of butter 52
Citrobacter, in spoilage of processed milk 9
Cladosporium, in spoilage of butter 55
 in spoilage of cheese 68
Clostridium botulinum, growth and toxin production after carbon dioxide addition in processing of raw milk 4
 in spoilage of cheese 73
 pathogen profile 147-8
 survival in fermented milks 88
Clostridium butyricum, causing late blowing in cheese 68-9
Clostridium perfringens, pathogen profile 149-50
Clostridium sporogenes, causing late blowing in cheese 68-9
Clostridium spp., growth and survival in condensed/evaporated milk 30
 in butter and dairy spreads 49
 in spoilage of sweetened condensed milk 29
 thermoduric microflora in milk 8
Clostridium tyrobutyricum, causing late blowing in cheese 68-9
 Clotted cream, definition 37
 processing 42
 Colostrum, composition 1
 Colours, in ice cream 97
 Concentrated and dried milk products, initial microflora 22
 Concentrated milk, growth and survival of pathogens 30-3
 processing of 23
 spoilage of 28-30
 Concentrated milk products 21-35
 Condensed milk, bulk 21
 growth and survival of pathogens 30
 processing of 23-4
 production (Fig.) 24
 spoilage of 28-9
 sweetened 21
 sweetened – processing of 24-5
 sweetened – spoilage of 29
 Cooling, in butter production 51
 in ice cream production 99
 Cooling and packaging, of processed cream 41
 of yoghurt 84
 Cream 37-47
 cultured – production of 78
 definitions 37-8
 fresh – as ingredient of ice cream 95
 growth and survival of pathogens 43-6
 initial microflora 38
 processing of 38-41
 production of (Fig.) 39
 spoilage of 42-3
 Cream-based desserts, definition 37
 processing of 42
 Cream ices, definition 93
 Crohn's disease, caused by MAP 14
Cronobacter, growth and survival in dried milk 32-3
 in spoilage of processed milk 9
Cronobacter sakazakii, in dried milk, causing neonatal meningitis 32-3
 pathogen profile 150-1

- Cryptococcus*, in spoilage of butter 55
- Crystallisation, in production of dairy spreads 54
- Cultured cream, production of 78
- Curd formation, in cheese production 65-6
- Custards, definition 93
- Dairy spreads 49-59
 - initial microflora 49
 - packaging 54
 - production 53-4
 - spoilage of 55-6, 57
- Debaryomyces hansenii*, in spoilage of cheese 68
- Deep cooling, in processing of raw milk 4
- Discolouration, in cheese 69
- Distribution, of ice cream 100
- Dried and concentrated milks, growth and survival of pathogens 30-3
 - spoilage of 28-30
- Dried milk, growth and survival of pathogens 31-2
 - processing 26-8
 - spoilage of 30
 - spray drying 26-7
- Dried milk products 21-35
- Emulsification, in production of dairy spreads 53
 - in production of ice cream 97
- Enterobacter*, refer to *Cronobacter*
- Enterobacteriaceae, causing faecal taints in processed milk 9
 - in spoilage of condensed milk 28
 - surviving the drying process in milk processing 27
- Enterococci, causing discolouration in cheese 69
 - in spoilage of condensed milk 28
- Enterococcus faecalis*, growth in dairy spreads 54
 - isolated in pasteurised milk 6
- Enterococcus faecium*, concern over use as starter culture in fermented milks 89
 - growth in dairy spreads 54
 - isolated in pasteurised milk 6
- Enterobacteriaceae, presence in stored raw milk 3
- Enteropathogenic *E. coli*, causing outbreaks of disease associated with cheese 69, 71
- Escherichia coli*, causing spoilage in cheese 71
- Escherichia coli* O157 151-2
 - in raw milk 10
 - outbreak of infection by 46
- Escherichia coli* O157:H7, survival in fermented milks 87
- Escherichia faecium*, in spoilage of dairy spreads 56
- EU food hygiene legislation 119-43
 - legislative structure 120-1
- Evaporated milk, 21-2
 - growth and survival of pathogens 30
 - processing of 25-6
 - production (Fig.) 26
 - stabilisation 25
- Faecal taints, caused by Enterobacteriaceae in processed milk 9
- Fermentation, of milk 83-4
- Fermented milk 77-91
 - growth and survival of pathogens 86-9
 - production of (Fig) 82
- Filling and packaging, of processed milk 8
- Flavobacterium* spp., causing discolouration in cheese 69
 - in spoilage of butter 55
 - in spoilage of cheese 68
 - in spoilage of processed milk 9
 - presence in stored raw milk 3
- Flavours, in ice cream 97
- Food Hygiene (England) Regulations 140-1
- Food hygiene legislation (EU) 119-43
- Food safety criteria, EU legislation (Table) 133
- Foot and Mouth Disease virus, in raw milk 14
- Freezing, in ice cream production 99
- French ice creams, definition 93
- Fresh cream, as ingredient of ice cream 95
- Fresh whole milk, as ingredient of ice cream 95
- Frozen cream, definition 37
 - processing of 42
- Frozen yoghurts, definition 94
- Fungal spoilage, of butter 55
 - of cheese 67-8
- Fusarium*, in cheese spoilage 68
- Geotrichum candidum*, in spoilage of bakers' cream 43
 - in spoilage of butter 55
 - in spoilage of cheese 68
- Glyceryl monostearate, as emulsifier in ice cream 97
- Gram-negative psychrotrophs, causing ropiness and partial coagulation in processed milk 9
- Gram-positive species, presence in stored raw milk 3
- Guar, as stabiliser in ice cream 97
- HACCP 105-18
 - EU legislation 125
 - implementation and review of plan 115-6
 - logic sequence for application (Fig.) 108
 - seven basic principles 106-7
 - twelve stages of logic sequence 107-115
- Haemolytic uraemic syndrome, caused by VTEC in ice cream 102

- Hard/low-moisture cheese, definition 61
- Heat treatment, in processing of fermented milk 83
- in production of cream 40-1
 - in production of ice cream 98
- High-pressure processing, of milk 7
- High-temperature short-time treatment, in ice cream production 98
- Histamine, presence in cheese 74
- Homogenisation, in processing of raw milk 5
- in production of cream 40
 - in production of ice cream 98
- HTST processes, in production of cream 40
- Hygiene of foodstuffs, EU Regulation 121
- Hygiene rules for food of animal origin, EU legislation 125-31
- Ice cream and related products 93-104
- Ice cream, growth and survival of pathogens 101
- ingredients 95-7
 - processing 94-9
 - production of (Fig.) 95
- Ices, definition 93
- Immunoglobulins, effect on pathogens in bovine milk 2
- Irradiation, in processing of milk 7
- Johne's disease, caused by MAP 14
- Kefir, production 80
- Klebsiella*, in spoilage of processed milk 9
- Khuyveromyces*, in spoilage of yoghurt 85
- Khuyveromyces marxianus*, in spoilage of cheese 68
- Koumiss, production of 80
- Lactic acid bacteria, as starter cultures (Table) 65
- Lactic fermentations, of fermented milks 77-80
- Lactobacilli, isolated in pasteurised milk 6
- Lactobacillus*, as starter culture in thermophilic fermentation of milk 78-9
- Lactobacillus delbrueckii*, as starter culture for cheese 63
- Lactobacillus delbrueckii* subsp. *bulgaricus*, as starter culture in acid buttermilk production 79
- as starter culture in yoghurt production 79 83
- Lactobacillus helveticus*, as starter culture for cheese 63
- Lactococcus* spp., as starter cultures in fermentation of buttermilk 77-8
- Lactococcus lactis*, as starter culture for cheese 63
- Lactococcus lactis* biovar *diacetylus*, as starter culture for ripened cream butter 51
- Lactococcus lactis* subsp. *lactis*, as starter culture for ripened cream butter 51
- Lactococcus mesenteroides* subsp. *cremoris*, as starter culture for ripened cream butter 51
- Lactoferrin, antimicrobial activity in bovine milk 3
- Lactoperoxidase, bactericidal activity in bovine milk 3
- Late blowing, in cheese 68-9
- Lben, fermented dairy product 78
- Leaky butter, as result of inadequate working in production 52
- Legislation, EU food hygiene 119-43
- Leuconostoc mesenteroides* subsp. *cremoris*, as starter culture for ripened cream butter 51
- as starter culture in fermentation of buttermilk 78
- Liquid milk products 1-19
- Listeria monocytogenes*, causing outbreaks of disease associated with cheese 69
- contaminant in butter 56-7
 - contaminant in ice cream 96,100, 101-2
 - growth in cream 44
 - growth in dairy spreads 57
 - growth in dried milk 32
 - growth in pasteurised milk products 11-2
 - growth in raw milk 10
 - increase in heat resistance in ice cream production 98
 - survival in fermented milks 86-7
 - survival of drying process in milk processing 27
 - survival of thermisation of raw milk 4
- Listeria* spp., causing spoilage in cheese 63, 70-1
- pathogen profile 152-3
- Listeriosis, associated with butter 56-7
- associated with cheese 69
 - associated with ice cream 102
 - associated with pasteurised milk products 11-2
- Locust bean, as stabiliser in ice cream 97
- Logic sequence, for application of HACCP (Fig.) 107
- Long-time pasteurisation, in ice cream production 98
- Lysozyme, effect on bacteria in bovine milk 3
- Mala, fermented dairy product 78
- MAP, as cause of Johne's and Crohn's disease 14
- Mastitis, as cause of contamination in bovine milk 1-2
- Maziwa, fermented dairy product 78
- Mesophilic fermentation, of milk 77-8
- Microbacterium lacticum*, survival of pasteurisation process in butter 51
- Microbial rennet, in cheese production 66
- Microbiological criteria for foodstuffs, EU legislation 132-40

- Micrococcus*, in spoilage of butter 55
 isolated in pasteurised milk 6
- Microfiltration, in processing of milk 7
- Microflora, initial – of bovine milk 1-2
 of butter and dairy spreads 49
 of cheese 62
 of concentrated and dried milk products 22
 of cream 38
 of fermented milk 81
 of ice cream products 94
- Microwaving, in processing of milk 7
- Milk ices, definition 93
- Milk products, liquid 1-19
- Mixing, in ice cream production 97
- Modified-atmosphere packaging, of cheese to prevent mould growth 68
- Monilia*, in cheese spoilage 68
- Mould, as indicator of post-process contamination in milk 9
 growth on cheese 67-8
 in spoilage of butter 55
 in spoilage of dried milks 30
 in spoilage of yoghurt 86
- Mould-lactic fermentations, of milk 80-1
- Mousse, definition 93
- Mucor*, in spoilage of butter 55
 in spoilage of cheese 68
 in spoilage of yoghurt 86
- Mucor miehei*, use in coagulation in cheese production 66
- Mycobacterium avium* subsp. *paratuberculosis*, in pasteurised milk products 14
- Mycotoxins, presence in cheese 73
 survival in fermented milks 88
- Natamycin, as antifungal agent in packaging of cheese 68
- Natural antimicrobial factors, in bovine milk 2-3
- NFMS, as ingredients in ice cream 95
- Nisin, use in cheese production to prevent late blowing 69
- NIZO process, in production of ripened cream butter 51
- Nordic sour milk, production of 78
- Off-flavours, caused by Gram-negative psychrotrophs in processed milk 9
- Osmophilic yeasts, in spoilage of sweetened condensed milk 29
- Packaging, of butter 52
 of dairy spreads 54
 of ice cream 99
 of processed cream 41
 of processed milk 8
 of yoghurt 84
- Partial coagulation, caused by Gram-negative psychrotrophs in processed milk 9
- Pasteurisation, of cheese 63
 of dairy spreads 54
 of raw milk 5-6
 time-temperature requirements 5
- Pasteurised cream 38
- Pasteurised milk products 10-1
 microbiological spoilage 8-9
- Pathogen profiles 145-61
- Pathogens, growth and survival in butter and dairy spreads 56-7
 growth and survival in cheese 69-74
 growth and survival in cream 43-6
 growth and survival in dried and concentrated milks 30-3
 growth and survival in fermented milks 86-9
 growth and survival in ice cream 101
 growth and survival in milk 10-5
- Penicillium*, in spoilage of butter 55
 in spoilage of cheese 68
 in spoilage of cream 43
 in spoilage of dairy spreads 55
 in spoilage of yoghurt 86
- Penicillium frequentans*, as contaminant in yoghurt 89
- Pichia*, as contaminant in ice cream 96
 in spoilage of cheese 68
 in spoilage of yoghurt 85
- Plate-heat exchangers, use in pasteurisation of milk 5
- Poliovirus, survival in unpasteurised cheese 73
- Polyoxethylene glycol, as emulsifier in ice cream 97
- Post-process contamination, in ice cream 102
 in milk 9
- Probiotic cultures, in fermented products 89
- Probiotic fermentation, of milks 79-80
- Probiotic products, in production of yoghurt 84-5
- Process hygiene criteria, EU legislation 136-9
- Processed cheeses, 67
- Processed milk, filling and packaging 8
- Processing, effects on microflora of bovine milk 3-7
 effects on microflora of concentrated and dried milk 22-3
 of butter and dairy spreads 50-3
 of cheese 62-7
 of cream 38
 of fermented milk 81-4
- Propionibacterium* spp., causing discolouration in cheese 69
- Proteus*, in spoilage of cream 43
- Pseudomonads, in pasteurised cream 43
 in spoilage of cheese 68

- in spoilage of condensed milk 28
- in spoilage of processed milk 9
- in spoilage of UHT processed milk 10
- in stored raw milk 3
- Pseudomonas fluorescens*, in spoilage of butter 55
 - in spoilage of cheese 68
- Pseudomonas fragi*, in spoilage of butter 55
 - in spoilage of cheese 68
 - source of contamination in ice cream 95
- Pseudomonas nigrificans*, in spoilage of butter 55
- Pseudomonas putida*, in spoilage of cheese 68
- Pseudomonas putrefaciens*, in spoilage of butter 55
- Pseudomonas* spp., in spoilage of cheese 68
- Pseudomonas* spp., psychrotrophic – in spoilage of cream 38
- Psychrotrophic bacteria, growth during storage of raw milk 3
- Pulsed-electric field, in processing of milk 7
- Registration of food business operators, EU legislation 125
- Rennet, in cheese production 66
- Rhizopus*, in spoilage of butter 55
 - in spoilage of yoghurt 86
- Rhodotorula*, in spoilage of butter 55
 - in spoilage of yoghurt 85
- Ripened cream butter 51-4
- Ripening, of cheese 66-7
- Ropiness, caused by Gram-negative psychrotrophs in processed milk 9
- Saccharomyces*, in spoilage of yoghurt 85
- Salmonella*, in cheese 63
 - in ice cream 97, 99
 - in pasteurised milk products 10-1
- Salmonella enteritidis*, as cause of food-poisoning associated with cream 44
 - as cause of food poisoning associated with ice cream 101
- Salmonella* spp. 153-4
 - as contaminants in cream 44
 - causing spoilage in cheese 71-2
 - growth and survival in dried milk 31
 - in raw milk 10
- Salmonella typhimurium* DT40, as cause of food-poisoning associated with cream 44
- Salmonellosis, outbreaks associated with cheese 69, 72
 - outbreaks associated with cream 44
 - outbreaks associated with dried milk 31
 - outbreaks associated with pasteurised milk products, 10-1
- Salting, in production of butter 52
 - in production of cheese 66
- Semi-soft/semi-hard cheese, definition 61
- Separation, in processing of raw milk 5
 - in production of cream 39-40
- Sherbet, definition 93
- Shewanella putrefaciens*, in spoilage of butter 55
- Shigella* spp., cause of illness associated with cheese 73
- Skimmed milk powder, production of (Fig.) 28
- Soft cheese, definition 61
- Soft-serve ice cream 100
- Sorbets, definition 93
- Sorbic acid, as antifungal agent in packaging of cheese 68
- Sorbitol esters, as emulsifiers in ice cream 97
- Splits, definition 94
- Spoilage, of butter and dairy spreads 55-6
 - of cheese 67-9
 - of cream 42-3
 - of dried and concentrated milk 28-30
 - of fermented milks 85-6
 - of ice cream 100-1
 - of processed milk 8-9
 - of sweetened condensed milk 29
- Spray-drying, of milk 26-7
- Stabilisation, of evaporated milk 25
- Stabilisers, in ice cream 96-7
- Staphylococcal food poisoning, outbreaks associated with butter 56
- Staphylococcus*, presence in cheese 63
- Staphylococcus aureus*, as post-process contaminant in cream 45
 - as post-process contaminant in ice cream 102
 - causing outbreaks of food poisoning 13-4
 - growth and survival in cheese 64, 72
 - growth and survival in condensed/evaporated milk 30
 - growth and survival in dried milk 31-2
 - in contamination of butter 56
 - in dried milk – as cause of food poisoning outbreaks 31-2
 - in pasteurised milk products 13-4
 - pathogen profile 154-6
 - survival in fermented milks 87-8
- Staphylococcus intermedius*, cause of food-poisoning outbreak associated with butter 57
- Starter cultures, in production of cheese 63-5
- Starter failure, in cheese production 64
- Sterilisation process, for milk 6-7
- Sterilised creams 38
- Sterilised milk 9-10
- Stirred milk, production of (Fig) 82
- Storage and transport, of raw milk 3-4, 38-9
- Streptococci, survival of pasteurisation process in butter 51
- Streptococcus thermophilus*, as starter culture for acid buttermilk production 79

INDEX

- as starter culture for cheese 63
- as starter culture for yoghurt production 79, 83
- as starter culture in thermophilic fermentation of milk 78-9
- Sugars, as ingredients in ice cream 96
- Susa, fermented dairy product 78
- Sweet curdling, caused by *Bacillus cereus* in cream 42
 - caused by *Bacillus cereus* in milk 8
- Sweetened condensed milk 21
 - processing of 24-5
 - spoilage of 29
- Temperature control, importance in transport and storage of raw milk 3
- Therapeutic fermentation, of milks 79-80
- Thermisation, in processing of cheese 63
 - in processing of raw milk 4
- Thermoduric organisms, in spoilage of cream-based desserts 43
 - in spoilage of milk 8
 - survival of pasteurisation 6
- Thermophilic fermentation, of milk 78-9
- Torula*, as contaminant in ice cream 96
- Torula cremoris*, in spoilage of cream 43
- Torulopsis*, in spoilage of butter 55
 - in spoilage of sweetened condensed milk 29
 - in spoilage of yoghurt 85
- Torulopsis sphaerica*, in spoilage of cream 43
- Toxins, in pasteurised milk products 15
- Transport and storage, of raw milk 3-4, 38-9
- Trichoderma harzianum*, in spoilage of dairy spreads 55
- Tyramine, presence in cheese 74
- UHT milk 9-10
- UHT process, for milk 6-7
 - in ice cream production 98
- UHT sterilisation processes, in production of cream 41
- Ultra-high-pressure homogenisation, in processing of milk 7
- Ultra-high-temperature creams 38
- Ultra-sound treatment, in processing of milk 7
- Untreated cream 38
- Vacuum packaging, of cheese to prevent mould growth 68
- Value-added cheese 67
- Verotoxigenic *Escherichia coli* (VTEC), causing outbreaks of food poisoning 12
 - growth and survival in cream 46
 - in cheese 63
 - in ice cream 102
 - in pasteurised milk products 12-3
- Villi, production of 81
- Viral hepatitis, infection associated with dairy products 46
- Viruses, in pasteurised milk products 14-5
- VTEC, see Verotoxigenic *Escherichia coli*
- Water ices, definition 93
- Whipped cream, processing of 41-2
- Whipping (whipped) cream, definition 37
- Whole milk, fresh – as ingredient of ice cream 95
- Working, in production of butter 52
 - in production of dairy spreads 54
- Xanthan, as stabiliser in ice cream 97
- Xerophilic moulds, source of contamination in ice cream 97
- Yakult, production 79
- Yarrowia lipolytica*, in spoilage of cheese 68
 - in spoilage of dairy spreads 55-6
- Yeast, as indicator of post-process contamination of milk 9
 - causing discolouration in cheese 69
 - in ice cream 97
 - in spoilage of butter 55
 - in spoilage of fermented milks 85-6
- Yeast-lactic fermentations, of milk 80
- Yersinia enterocolitica*, causing outbreaks of food poisoning 12
 - growth in dairy spreads 57
 - in pasteurised cream 45
 - in pasteurised milk products 13
 - pathogen profile 156-7
- Yersinia* spp., survival in fermented milks 88
- Ymer, as type of buttermilk 78
- Yoghurt 79
 - cooling and packing 84
 - frozen, definition 94
- Zygosaccharomyces*, as contaminant in ice cream 96

CONTENTS

CONTRIBUTORS	iii
FOREWORD	v
INTRODUCTION	xi
1. CHILLED AND FROZEN RAW FISH	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. CHILLED 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 Criteria	87
4.7 References	89
4.8 Further Reading	92

5.	CURED, SMOKED AND DRIED FISH	93
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.	FERMENTED 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.	HACCP 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	189
9.1	Introduction	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 Food of Animal Origin	196
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	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 <i>Aeromonas</i> spp.	225
	10.2 <i>Clostridium botulinum</i>	226
	10.3 <i>Clostridium perfringens</i>	227
	10.4 <i>Listeria</i> spp.	229
	10.5 <i>Plesiomonas</i>	230
	10.6 <i>Salmonella</i> spp.	230
	10.7 <i>Staphylococcus aureus</i>	232
	10.8 <i>Vibrio cholerae</i>	233
	10.9 <i>Vibrio parahaemolyticus</i>	234
	10.10 <i>Vibrio vulnificus</i>	235
	10.11 References	236
	CONTACTS	241
	INDEX	247

CONTENTS

CONTRIBUTORS	iii
FOREWORD	v
INTRODUCTION	ix
1. CHILLED AND FROZEN RAW MEAT, POULTRY AND THEIR PRODUCTS	1
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. COOKED 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. DRIED 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. FERMENTED 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.	HACCP 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 FOOD 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 Products 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.	PATHOGEN PROFILES	263
9.1	<i>Campylobacter</i> spp.	263
9.2	<i>Clostridium botulinum</i>	264
9.3	<i>Clostridium perfringens</i>	266
9.4	<i>Escherichia coli</i> O157	267
9.5	<i>Listeria</i> spp.	268
9.6	<i>Salmonella</i> spp.	269
9.7	<i>Staphylococcus aureus</i>	271
9.8	<i>Yersinia</i> spp.	272
9.9	References	273
	CONTACTS	279
	INDEX	289

CONTENTS

CONTRIBUTORS	iii
FOREWORD	v
INTRODUCTION	ix
1. CHILLED AND FROZEN RAW MEAT, POULTRY AND THEIR PRODUCTS	1
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. COOKED 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. DRIED 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. FERMENTED 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.	HACCP 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 FOOD 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 Products 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.	PATHOGEN PROFILES	263
9.1	<i>Campylobacter</i> spp.	263
9.2	<i>Clostridium botulinum</i>	264
9.3	<i>Clostridium perfringens</i>	266
9.4	<i>Escherichia coli</i> O157	267
9.5	<i>Listeria</i> spp.	268
9.6	<i>Salmonella</i> spp.	269
9.7	<i>Staphylococcus aureus</i>	271
9.8	<i>Yersinia</i> spp.	272
9.9	References	273
	CONTACTS	279
	INDEX	289