

Contents

<i>List of contributors</i>	xi
<i>Preface: review of the market for, and sources of, canned fish</i>	xiii
1 Legal requirements for producers selling canned fish into Europe	1
John Hammond	
1.1 Introduction	1
1.2 Imports into the EU	2
1.3 General food law	2
1.4 Product-specific controls	4
1.5 Hygiene rules	6
1.6 Fishery products from outside the EU	8
1.7 Identification marking	10
1.8 Microbiological criteria	10
1.9 Labelling	11
1.10 Lot marking	20
1.11 Food contact materials	22
1.12 Additives	24
1.13 Flavourings	25
1.14 Contaminants	26
1.15 Pesticides	26
1.16 Veterinary medicinal products	27
1.17 Weights and measures	28
1.18 Warning	29
References	29
2 Legal requirements for producers selling canned fish into North America	32
Kenneth Lum	
2.1 Introduction	32
2.2 Canned fish description	32
2.3 Why are regulations necessary?	33
2.4 Legal requirements and food safety	33
2.5 Regulatory systems in Canada and the United States	34
2.6 Canadian requirements	34
2.7 United States requirements	43
3 HACCP systems for ensuring the food safety of canned fish products	51
Alan Williams	
3.1 Introduction	51
3.2 The HACCP Principles	52

3.3	Prerequisite programmes	52
3.4	How to set up and conduct an HACCP study for canned fish products	54
3.5	Implementation	74
3.6	ISO 22000	74
3.7	Conclusions	74
	References	75
	Appendix 1: Useful websites (for HACCP Guidance and including generic HACCP plans in some cases)	77
	Appendix 2: Modular HACCP approach for the canning of tuna products, showing typical activities within each module	78
	Appendix 3: Example of a tabular documentation format for prerequisite programmes	79
	Appendix 4: Extract from a non-tabular format HACCP plan approach for can seaming (CCP 2)	80
	Appendix 5: Extract of a tabular HACCP Chart for CCP 3 sterilisation and CCP 4 in the generic fish canning flow diagram	82
4	National and international food safety certification schemes	85
	Harriet Simmons	
4.1	Introduction	85
4.2	Food safety legislation	85
4.3	Food safety management systems	85
4.4	Certification: A brief overview	86
4.5	Hazard analysis critical control points	88
4.6	The Global Food Safety Initiative	90
4.7	A comparison of major global certification programmes for food safety	100
4.8	Summary of comparison of global certification programmes	100
5	Fish quality	102
	Tony Garthwaite	
5.1	Introduction	102
5.2	Important fish species	102
5.3	Pollution aspects	104
5.4	Handling and transport	106
5.5	Spoilage factors	106
5.6	Reception and testing	111
5.7	Storage	114
5.8	Defrosting frozen fish	116
5.9	Fish preparation	121
5.10	Chemical indicators of quality	130
	References	130
6	Design and operation of frozen cold stores	132
	Stephen J. James and Christian James	
6.1	Introduction	132
6.2	Factors affecting frozen storage life	133

6.3	Cold store design	140
6.4	Specification and optimisation of cold stores	143
6.5	Thawing	145
6.6	Conclusions	149
	References	150
7	Packaging formats for heat-sterilised canned fish products	151
	Bev Page	
7.1	Overview of the basic materials used for heat-sterilised fish packaging	151
7.2	Metal cans for heat sterilised-fish products	151
7.3	Plastic containers for heat-sterilised fish products	177
7.4	Glass containers for heat-sterilised fish products	177
	Further reading	178
8	Retorting machinery for the manufacture of heat-sterilised fish products	179
	Claude Vincent	
8.1	Introduction	179
8.2	Retorting equipment available	180
8.3	Technical features of horizontal batch retorts	195
8.4	General arrangement of a sterilising plant	200
8.5	Utilities required for batch retorts	203
8.6	The different usages of a retort	207
8.7	Legal steps to be taken when installing a new retort	208
9	Management of thermal process	210
	Nick May	
9.1	Role of the thermal process manager	210
9.2	Documentation of thermal process requirements	211
9.3	Maintaining and calibration of key instrumentation	213
9.4	Training of key staff	214
9.5	Review of production records	215
9.6	Managing non-conformance (process deviations)	215
9.7	Conclusion	217
	References	217
10	Principal causes of spoilage in canned fish products	218
	Joy Gaze	
10.1	The quality of raw materials	218
10.2	Hygiene and good manufacturing practice	219
10.3	Potential spoilage issues associated with canned fish products	219
10.4	Typical causes of spoilage in canned fish products	220
10.5	Types of spoilage	221
10.6	Microbiological examination of suspect spoilt cans	223
10.7	Microbiological investigations – decision criteria	223
10.8	Conclusion	223
	References	224

11	Commercial sterility and the validation of thermal processes	225
	Geoff Shaw	
11.1	Introduction	225
11.2	Temperature measurement systems	226
11.3	Processing vessels	228
11.4	Temperature distribution	228
11.5	Retort survey	229
11.6	Test loading	229
11.7	Data analysis	230
11.8	Heat penetration measurement	231
11.9	Commercial sterility and lethality	231
11.10	General method	233
11.11	Heat penetration experimental methods	234
11.12	Flexible packaging	235
11.13	Future developments and information	236
	References	236
	Other sources of information	237
12	The quality department in a fish cannery	238
	Leila Radi	
12.1	Avant-propos	238
12.2	The organisation and the scope of operations of the quality department	238
12.3	Quality assurance for the management of pre-requisite measures	239
12.4	Quality control	244
12.5	Establishment of a quality plan	246
12.6	Standard quality procedures	246
12.7	Training of quality staff against procedures	247
12.8	Handling of non-conforming materials	247
12.9	Establishment and monitoring of corrective actions	248
12.10	Legislative compliance	248
12.11	Research and development	249
12.12	Security	249
12.13	Conclusion	250
	Acknowledgement	250
	References	250
13	The laboratory in a fish canning factory	251
	Linda Nicolaides and Les Bratt	
13.1	Laboratory facilities	251
13.2	Chemical analyses	254
13.3	Microbiological testing	255
13.4	Analysis required for cannery water and retort cooling water	256
13.5	Swab testing	256
13.6	Incubation tests	257
13.7	Sterility tests	257
13.8	Laboratory accreditation	260
	Further reading	260

14	Cleaning and disinfection in the fish canning industry	262
	Peter Littleton	
14.1	Introduction	262
14.2	The cleaning process	262
14.3	Principles of cleaning	264
14.4	Open plant cleaning	265
14.5	Floor cleaning	270
14.6	Tray and rack washing machines	271
14.7	Principles of disinfection	272
14.8	Factors affecting disinfectant effectiveness	273
14.9	Choosing the right disinfectant	274
14.10	Where to disinfect	274
14.11	Types of disinfectants	275
14.12	Oxidising disinfectants	275
14.13	Non-oxidising disinfectants	277
14.14	Effects of time and concentration	278
14.15	Specific issues relating to fish canning operations	279
14.16	Cleaning management	279
14.17	Cleaning programme	280
	References	282
15	The canning factory	283
	Les Bratt	
15.1	The fish canning factory: Introduction	283
15.2	Site selection	283
15.3	Factory design and construction	284
15.4	The principal areas of the factory	289
15.5	Services	296
	References and suggestions for further reading	298
	<i>Index</i>	299