

Contents

<i>Contributor contact details</i>	<i>xiii</i>
1 Introduction	1
<i>C. Leifert, Newcastle University, UK</i>	
Part I Organic food safety and quality: introduction and overview	
History and concepts of food quality and safety in organic food production and processing	9
<i>U. Niggli, FiBL, Switzerland</i>	
2.1 Introduction	9
2.2 History of different food concepts of organic farming ...	10
2.3 Where are modern organic food and farming concepts heading?	14
2.4 Conclusions	21
2.5 References	21
3 Nutritional quality of foods	25
<i>C. J. Seal and K. Brandt, Newcastle University, UK</i>	
3.1 Introduction	25
3.2 Methods for determining changes in nutritional quality	27
3.3 Conclusions	37
3.4 References	38
4 Quality assurance, inspection and certification of organic foods	41
<i>B. van Elzakker, Agro Eco Consultancy BV, The Netherlands and J. Neuendorff, Gesellschaft für Ressourcenschutz mbH, Germany</i>	
4.1 Introduction to quality assurance in organic foods	41
4.2 The regulation	42
4.3 Responsibilities	43

4.4	Quality assurance	44
4.5	Private. additional certifications	45
4.6	Quality assurance to ensure quality and safety of organic and 'low input' foods	47
4.7	Risk assessment in organic quality assurance	48
4.8	Outlook	50
4.9	Sources of further information and advice	51
4.10	References	52
5	A new food quality concept based on life processes.....	53
	<i>J. Bloksma, M. Northolt, M. Huber, G-J. van der Burgt and L. van de Vijver, Louis Bolk Instituut. The Netherlands</i>	
5.1	Introduction	53
5.2	Description of the inner quality concept	54
5.3	Method for validation of the inner quality concept	61
5.4	Experiments to validate the inner quality concept	64
5.5	Progress made in the validation of the concept	69
5.6	Perspective for farmers. traders and consumers	70
5.7	References	71
6	Food consumers and organic agriculture.....	74
	<i>E. Oughton and C. Ritson, Newcastle University. UK</i>	
6.1	Introduction	74
6.2	The expanding organic market: consumer led or producer driven?	77
6.3	Factors influencing organic purchase	80
6.4	The price premium	87
6.5	Conclusions	91
6.6	References	92
Part II Organic livestock foods		
7	Effects of organic and conventional feeding regimes and husbandry methods on the quality of milk and dairy products.....	97
	<i>R. F. Weller, C. L. Marley and J. M. Moorby, Institute of Grassland and Environmental Research. UK</i>	
7.1	Introduction	97
7.2	Quality parameters in dairy products	98
7.3	Factors affecting the nutritional quality of liquid milk and milk products	105
7.4	Procedures for implementing methods to improve the nutritional quality of milk products.....	111
7.5	Future trends and priority areas for research and development	111
7.6	References	112

8	Effects of organic husbandry methods and feeding regimes on poultry quality	117
	<i>H. Hirt and E. Zeltner, FiBL, Switzerland and C. Leifert, Newcastle University. UK</i>	
8.1	Introduction.....	117
8.2	Sensory and nutritional quality	118
8.3	Animal welfare related quality parameters	123
8.4	Poultry health management and risk from foodborne diseases	133
8.5	Veterinary medicine use and residues	136
8.6	Toxic chemicals and heavy metals	136
8.7	Maintaining quality during processing	137
8.8	Alternative assessment systems for organic food quality	138
8.9	Acknowledgements	138
8.10	Sources of further information and advice.....	139
8.11	References.....	139
9	Quality in organic, low-input and conventional pig production	144
	<i>A. Sundrum, University of Kassel, Germany</i>	
9.1	Introduction	144
9.2	Perception of quality	144
9.3	Framework conditions of pig production	147
9.4	Consumer perception	151
9.5	Product quality	153
9.6	Animal welfare issues	161
9.7	Environmental impact	162
9.8	Constraints and potentials for quality production.....	163
9.9	Conclusion	167
9.10	References.....	169
10	Organic livestock husbandry methods and the microbiological safety of ruminant production systems	178
	<i>F. Diez-Gonzalez, University of Minnesota. USA</i>	
10.1	Introduction.....	178
10.2	Effect of forage to concentrate ratios on enteric pathogen prevalence and shedding	180
10.3	Effect of livestock breed and husbandry (including veterinary antibiotic treatments) on the incidence of pathogens and antibiotic-resistant bacteria	187
10.4	Effect of stress on enteric pathogen shedding	189
10.5	Reducing enteric pathogen transfer risks in organic and 'low input' systems: outline of strategies.....	191
10.6	Future trends.....	193
10.7	Sources of further information and advice.....	194
10.8	References.....	195

11	Reducing antibiotic use for mastitis treatment in organic dairy production systems	199
	<i>P. Klocke and M. Walkenhorst, FiBL, Switzerland and G. Butler, Newcastle University, UK</i>	
11.1	Introduction	199
11.2	Causes and epidemiology of mastitis	200
11.3	Symptoms of mastitis	201
11.4	Mastitis management and treatment	202
11.5	Husbandry and environmental improvement	212
11.6	Breeding strategies	212
11.7	Integration of management and treatment approaches: farm specific mastitis management plans	213
11.8	Acknowledgement	215
11.9	References	216
12	Reducing anthelmintic use for the control of internal parasites in organic livestock systems.....	221
	<i>V. Maurer, P. Hordegen and H. Hertzberg, FiBL, Switzerland</i>	
12.1	Introduction	221
12.2	Ruminants	222
12.3	Non-ruminants	231
12.4	Future trends	234
12.5	References	235
13	Alternative therapies to reduce enteric bacterial infections and improve the microbiological safety of pig and poultry production systems	241
	<i>B. Biavati and C. Santini. Bologna University. Italy and C. Leifert, Newcastle University. UK</i>	
13.1	Introduction	241
13.2	Anatomy and physiology of digestive tracts of monogastric livestock	242
13.3	Intestinal bacteria and their potential as probiotics	245
13.4	Probiotics for farm animals	247
13.5	Prebiotics for farm animals	252
13.6	Synbiotics	252
13.7	Acid activated antimicrobials (AAA)	254
13.8	Conclusion	256
13.9	References	257
Part III Organic crop foods		
14	Dietary exposure to pesticides from organic and conventional food production systems	265
	<i>C. Benbrook. The Organic Center; USA</i>	
14.1	Introduction	265
14.2	Dietary exposure data sources	267

14.3	Organic food and pesticide residues	271
14.4	Reducing exposure to the OP insecticides	279
14.5	Need to reduce exposures further	290
14.6	Endnote	293
14.7	References	294
15	Levels and potential health impacts of nutritionally relevant phytochemicals in organic and conventional food production systems	297
	<i>E. A. S. Rosa, R. N. Bennett and A. Aires. Universidade de Trás-os-Montes e Alto Douro, Portugal</i>	
15.1	Introduction	297
15.2	Plants as sources of phytochemicals	300
15.3	Assessment and bioavailability of phytochemicals	313
15.4	Potential positive and negative effects of phytochemicals on livestock and human health	314
15.5	Impact of phytochemicals on crop resistance to pests and diseases	314
15.6	Factors that modulate differences in phytochemical levels and other major constituents between organic and conventional farming	317
15.7	Gaps in knowledge – future research evaluations	322
15.8	References	322
16	Improving the quality and shelf life of fruit from organic production systems	330
	<i>F. P. Weibel and T. Alföldi, FiBL, Switzerland</i>	
16.1	Introduction	330
16.2	Reasons for varying fruit quality: interactions between site conditions and management factors	331
16.3	Comparison of quality parameters between organic and conventional fruit	342
16.4	Conclusions and future challenges	346
16.5	Acknowledgement	348
16.6	References	348
17	Strategies to reduce mycotoxin and fungal alkaloid contamination in organic and conventional cereal production systems	353
	<i>U. Kopke and B. Thiel. University of Bonn, Germany and S. Elmholt, University of Aarhus, Denmark</i>	
17.1	Introduction	353
17.2	Mycotoxin- and alkaloid-producing fungi	354
17.3	Problems associated with dietary mycotoxins/alkaloid intake in livestock and humans	358
17.4	Mycotoxin regulation and monitoring	360

19.9	Strategies used to reduce enteric pathogen contamination of crops via wild animal vectors	423
19.10	HACCP-based systems for integrated control of pathogen transfer into organic food supply chains	424
19.11	References	425
Part IV The organic food chain: processing, trading and quality assurance		
20	Post-harvest strategies to reduce enteric bacteria contamination of vegetable, nut and fruit products	433
	<i>G. S. Johannessen. National Veterinary Institute. Norway</i>	
20.1	Introduction	433
20.2	Processing strategies used	434
20.3	Differences in organic and conventional processing standards	435
20.4	Disadvantages of chlorine sanitation methods	436
20.5	Methods used to study the efficacy of disinfection methods	437
20.6	Alternative strategies to the use of chlorine for disinfection	438
20.7	Integration of strategies to minimize pathogen transfer risk during processing into organic and 'low input' standard systems	447
20.8	Conclusions	448
20.9	Sources of further information and advice	448
20.10	References	449
21	Fair trade: a basis for adequate producers' incomes, farm reinvestment and quality and safety focused production.....	454
	<i>M. Bourlakis. Brunel University. UK and C. Vizard. Newcastle University. UK</i>	
21.1	Introduction.....	454
21.2	Organic market	454
21.3	Ethical (fair) trade	456
21.4	View of stakeholders and key supply chain members.....	459
21.5	Conclusions	464
21.6	References	464
22	Development of quality assurance protocols to prevent GM-contamination of organic crops	466
	<i>R. C. Van Acker, University of Guelph. Canada; N. McLean and R. C. Martin. Nova Scotia Agricultural College. Canada</i>	
22.1	Introduction.....	466
22.2	Terminology	467
22.3	Examples of transgene escape	471
22.4	Implications of transgene escape	472

22.5	Mechanisms of transgene escape.....	474
22.6	Managing coexistence	477
22.7	Coexistence legislation.....	482
22.8	GM-free regions	483
22.9	Future research needs	484
22.10	Conclusion	484
22.11	Sources of further information and advice.....	485
22.12	References.....	485
23	Integration of quality parameters into food safety focused HACCP systems	490
	<i>K. Brandt and L. Luck. Newcastle University. UK; U. Kjærnes, National Institute for Consumer Research. Norway; G. S. Wyss, FiBL, Switzerland; and A. Hartvig Larsen, Aarstiderne. Denmark</i>	
23.1	Introduction.....	490
23.2	Need to integrate and focus control systems for quality and safety	491
23.3	Hazard analysis by critical control points	491
23.4	Introducing the Organic HACCP project	493
23.5	Benefits and drawbacks of using CCP-based systems at the level of a supply chain	494
23.6	Concerns about social and ethical values among consumers of organic food	496
23.7	Providing assurance that consumer concerns are met	497
23.8	How identification of quality-focused CCPs in organic food production chains was carried out in the Organic HACCP project	500
23.9	Examples of identified CCPs.....	502
23.10	Organisational and educational requirements for utilising this concept in real supply chains	504
23.11	Example of successful integration of the HACCP concept in a vegetable supply chain to control product quality as well as safety	505
23.12	Future research and development needs and trends	507
23.13	Sources of further information and advice.....	508
23.14	References	508
	<i>Index</i>	<i>510</i>