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Handbook of organic food safety and quality

Edited by J Cooper, C Leifert, Newcastle University, UK and U Niggli, Research Institute of Organic Agriculture (FiBL), Switzerland

- improve the safety, quality and health benefits of organic foods
- discusses the latest research findings in this area
- focuses on assuring quality and safety throughout the food chain
- quality assurance strategies are reviewed relating to specific organic food sectors

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Due to increasing consumer demand for safe, high quality, ethical foods, the production and consumption of organic food and produce has increased rapidly over the past two decades. In recent years the safety and quality of organic foods has been questioned. If consumer confidence and demand in the industry is to remain high, the safety, quality and health benefits of organic foods must be assured. With its distinguished editor and team of top international contributors, *Handbook of organic food safety and quality* provides a comprehensive review of the latest research in the area.

Part 1 provides an introduction to basic quality and safety with chapters on factors affecting the nutritional quality of foods, quality assurance and consumer expectations. Part 2 discusses the primary quality and safety issues related to the production of organic livestock foods including the effects of feeding regimes and husbandry on dairy products, poultry and pork. Further chapters discuss methods to control and reduce infections and parasites in livestock. Part 3 covers the main quality and safety issues concerning the production of organic crop foods, such as agronomic methods used in crop production and their effects on nutritional and sensory quality, as well as their potential health

impacts. The final part of the book focuses on assuring quality and safety throughout the food chain. Chapters focus on post-harvest strategies to reduce contamination of food and produce, and ethical issues such as fair trade products. The final chapters conclude by reviewing quality assurance strategies relating to specific organic food sectors.

The *Handbook of organic food quality and safety* will be a standard reference for professionals and producers within the industry concerned with improving and assuring the quality and safety of organic foods.

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#### About the editors

Julia Cooper is a Senior Research Fellow for the Nafferton Ecological Farming Group (NEFG) in the School of Agriculture, Food and Rural Development (AFRD) at Newcastle University, UK.

Carlo Leifert is Professor of Ecological Agriculture, NEFG group leader and Director of the Stockbridge Technology Centre (STC) at Newcastle University, UK.

*Urs Niggli* is Director of the Research Institute of Organic Agriculture in Switzerland. Many of the authors that have contributed to the book are partners or collaborators in the EU integrated project QualityLowInputFood (FP6-2002-Food-1-506358) and a range of chapters report results from the project.

### Titles which may also be of interest:

Improving the safety of fresh fruit and vegetables Handbook of hygiene control in the food industry Principles and practices for the safe processing of foods

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**ASSURANCE** 

#### Introduction

# PART 1 ORGANIC FOOD SAFETY AND QUALITY: INTRODUCTION AND OVERVIEW

### History and concepts of food quality and safety in organic food production and processing

U Niggli, Research Institute of Organic Agriculture (FiBL), Switzerland

- Introduction
- History of different food concepts of organic farming
- Where are modern organic food and farming concepts heading?
- Conclusions
- References

### Nutritional quality of foods

C J Seal and K Brandt, Newcastle University, UK

- Introduction
- Methods for determining changes in nutritional quality
- Conclusions
- References

### Quality assurance, inspection and certification of organic foods

B van Elzakker, Agro Eco Consultancy, The Netherlands and J Neuendorff, Gesellschaft für Ressourcenschutz mbH, Germany

- Introduction to quality assurance in organic foods
- The regulation
- Responsibilities
- Quality assurance
- Private, additional certifications
- Quality assurance to ensure quality and safety of organic and 'low input' foods

- Risk assessment in organic quality assurance
- Outlook
- Sources of further information
- References

#### A new food quality concept based on life processes

J Bloksma, M Northolt, M Huber, G J van der Burgt and L van de Vijver, Louis Bolk Instituut, The Netherlands

- Introduction
- Description of the inner quality concept
- Method for validation of the inner quality concept
- Experiments to validate the IQC
- Progress made in the validation of the concept
- Perspective for farmers, traders and consumers
- References

### Food consumers and organic agriculture

E Oughton and C Ritson, Newcastle University, UK

- Introduction
- The expanding organic market: consumer-led producer driven?
- Factors influencing organic purchase
- The price premium
- Conclusions
- References

### **PART 2 ORGANIC LIVESTOCK FOODS**

### Effects of organic and conventional feeding regimes and husbandry methods on the quality of milk and dairy products

R F Weller, C L Marley and J M Moorby, Biotechnology and Biological Sciences Research Council, UK

- Introduction
- quality parameters in dairy products
- Factors affecting the nutritional quality of liquid milk and milk products
- Procedures for implementing methods to improve the nutritional quality of milk products
- Future trends and the priority areas for research and development
- References

### Effects of organic husbandry methods and feeding regimes on poultry quality

H Hirt and E Zeltner, Research Institute of Organic Agriculture (FiBL), Switzerland and C Leifert, Newcastle University, UK

- Introduction
- Sensory and nutritional quality
- Animal welfare related quality parameters
- Poultry health management and risk from food borne diseases
- Veterinary medicine use and residues
- Toxic chemicals and heavy metals
- Maintaining quality during processing
- Alternative assessment systems for organic food quality
- Sources of further information and advice
- Acknowledgements
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### Effect of organic, husbandry and feeding regimes on pork quality

A Sundrum, University of Kassel, Germany

- Introduction
- Perception of quality
- Framework conditions of pig production
- Consumer perception
- Product quality
- Animal welfare
- Environmental impacts
- Constraints and potentials for quality production
- Conclusion
- References

### Organic livestock husbandry methods and the microbiological safety of ruminant

Diez-Gonzalez, University of Minnesota, USA

- Introduction
- Effect of forage to concentrate ratios on enteric pathogen prevalence and shedding
- Effect of livestock breed and husbandry (including veterinary antibiotic treatments) on the incidence of pathogens and antibiotic resistant bacteria
- Effect of stress on enteric pathogen shedding
- Reducing enteric pathogen transfer risks in organic and 'low input' systems: outline of strategies
- Future trends
- Sources of further information and advice

- References

# Reducing antibiotic use for mastitis treatment in organic dairy production systems

P Klocke and M Walkenhorst, Research Institute of Organic Agriculture (FiBL), Switzerland and G Butler, Newcastle University, UK

- Introduction
- Causes and epidemiology of mastitis
- Symptoms of mastitis
- Mastitis management and treatment
- Husbandry and environmental improvement
- Breeding strategies
- Integration of management and treatment approaches; farm specific mastitis management plans
- Acknowledgement
- References

### Reducing anthelmintic use for the control of internal parasites in organic livestock systems

V Maurer, P Hördegen and H Hertzberg, Research Institute of Organic Agriculture (FiBL), Switzerland

- Introduction
- Ruminants
- Non-ruminants
- Future trends
- References

### Alternative therapies to reduce enteric bacterial infections and improve the microbiological safety of pig and poultry production systems

B Biavati and C Santini, Bologna University, Italy and C Leifert, Newcastle University, UK

- Introduction
- Intestinal bacteria and their potential as probiotics
- Probiotics for farm animals
- Prebiotics for farm animals
- Synbiotics
- Acid activated antimicrobials (AAA)
- Conclusion
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#### PART 3 ORGANIC CROP FOODS

#### Dietary exposure to pesticides from organic and conventional food production

C Benbrook, The Organic Center, USA

- Introduction
- Dietary exposure data sources
- Organic food and pesticide residues
- Reducing exposure to the OP insecticides
- The need to further reduce exposures
- Endnote
- References

## Levels of potential health impacts of nutritionally relevant phytochemicals in organic and conventional food production systems

E A S Rosa, R N Bennett and A Aires, Universidade de Trás-os-Montes e Alto Douro, Portugal

- Introduction
- Plants as sources of phytochemicals
- assessment and bioavailability of phytochemicals
- Potential positive and negative effects of phytochemicals on livestock and human health
- Impact of phytochemicals on crop resistance to pests and diseases
- Factors that modulate differences in phytochemical levels and other major constituents between organic and conventional farming
- Gaps in knowledge future research evaluations
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### Improving the quality and shelf-life of fruit from organic production systems

F P Weibel and T Alfödi, FiBL, Switzerland

- Introduction
- Reasons for varying fruit quality: interactions between site conditions and management factors
- Comparison of quality parameters between organic and conventional fruit
- Conclusions and future challenges
- Acknowledgement
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Strategies to reduce mycotoxins and fungal alkaloid contamination in organic and conventional production systems

U Köpke, B Thiel, University of Bonn, Germany and S Elmholt, University of Aarhus, Denmark

- Introduction
- Mycotoxin and alkaloid producing fungi
- Problems associated with dietary mycotoxins/alkaloid intake in livestock and humans
- Mycotoxin regulation and monitoring
- Factors affecting mycotoxins/alkaloid contamination of cereal grains
- Agronomic strategies to reduce mycotoxins grain infection and mycotoxins levels
- Effect of harvest conditions and post harvest handling on mycotoxins contamination levels
- Do organic and 'low input systems' present a particular risk for mycotoxins contamination?
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### Reducing copper-based fungicide use in organic crop production systems

R Ghorbani, University of Mashad, Iran and S Wilcockson, Newcastle University, UK

- Introduction
- Effects of diseases on crop yield and quality in organic systems
- Crop protection with copper based fungicides in organic production systems
- Crop protection without copper-based fungicides
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# Pre-harvest strategies to ensure the microbiolgical safety of fruit and vegetables from manure-based production systems

U Köpke and J Krämer, University of Bonn, Germany and C Leifert, Newcastle University, UK

- Introduction
- Use of manure in organic 'low input' and conventional farming
- Risk of transfer of enteric pathogens from manure to fruit and vegetable crops
- Agronomic strategies to minimize pathogen transfer risk
- Strategies for reducing pathogen loads in manure through manure processing
- Strategies used to reduce enteric pathogen contamination of crops via irrigation water
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- Other sources of enteric pathogen contamination
- Strategies used to reduce enteric pathogen contamination of crops via wild animal vectors
- HACCP based systems for integrated control of pathogen transfer into organic food supply chains
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# PART 4 THE ORGANIC FOOD CHAIN: PROCESSING, TRADING AND QUALITY ASSURANCE

## Post-harvest strategies to reduce enteric bacteria contamination of vegetable, nut and fruit products

G S Johannessen, National Veterinary Institute, Norway

- Introduction
- Processing strategies used
- Differences in organic and conventional processing standards
- Disadvantages of chlorine sanitation methods
- Methods used to study the efficacy of disinfection methods
- Alternative strategies to the use of chlorine for disinfection
- Integration of strategies to minimise pathogen transfer risk during processing into organic and 'low input' standard systems
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# Fair trade: a basis for adequate producers' incomes, farm reinvestment and quality and safety focussed production

K Vizard, Newcastle University and M Bourlakis, Brunel University, UK

- Introduction
- Organic market
- Ethical (fair) trade
- The view of the stakeholders and the key supply chain members
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## Development of quality assurance protocols to prevent GM-contamination of organic crops

R C van Acker, University of Guelph, N McLean and R C Martin, Nova Scotia Agricultural

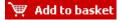
#### College, Canada

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### Integration of quality parameters into food safety focused HACCP systems

K Brandt, Newcastle University, UK, U Kjærnes, National Institute for Consumer Research, Norway, G S Wyss, Research Institute of Organic Agriculture (FiBL), Switzerland L Lück, Newcastle University, UK and A Hartvig Larsen, Aarstiderne, Denmark

- Introduction
- The need for integration and focusing of control systems for quality and safety
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- Benefits and drawbacks of using critical control point based systems at the level of a supply chain
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