PART 1 MICROBIAL DECONTAMINATION OF DIFFERENT FOOD PRODUCTS

Microbial decontamination of fresh produce
S Foong-Cunningham, E Verkaar and K Swanson, Ecolab Inc, Germany
- Introduction
- Pathogens of concern and pathways of contamination in fresh produce
- Current decontamination methods for fresh produce and their limitations
- Novel methods of fresh produce decontamination
- Conclusions and future trends in decontamination strategies
- Sources of further information and advice
- References

Microbial decontamination of raw and ready-to-eat meats
A Gill, Health Canada, and C Gill, Agriculture and Agri-Food Canada, Canada
- Introduction
- Decontamination of carcasses
- Chemical methods for decontamination of carcasses
- Decontamination of fresh meats
- Decontamination of processed meats
- Conclusions and Future Trends
- Sources of further information and advice
- References

Microbial decontamination of poultry carcasses
C Zweifel and R Stephan, Vetsuisse Faculty University of Zurich, Switzerland
- Introduction
- Contamination of poultry carcasses and major pathogens of concern
- Antibacterial activity of decontamination treatments for poultry carcasses
- Physical decontamination treatments for poultry carcasses
- Chemical decontamination treatments for poultry carcasses
- Combinations of chemical and physical or of chemical decontamination treatments for poultry carcasses
- Biological decontamination treatments for poultry carcasses
- Conclusions and future trends
- Sources of further information and advice
- References

Microbial decontamination of seafood
T Skåra and J Rosnes, Nofima, Norway and C Leadley, Campden BRI, UK
- Introduction
- Organisms of concern: pathogens that can contaminate fish surfaces
- Pathways of contamination
- Current methods for seafood decontamination
- Novel methods for seafood decontamination
- Regulatory issues surrounding decontamination of seafood
- Conclusions and future trends
- Sources of further information and advice
- References

Microbial decontamination of nuts and spices
G Atulungu, University of California Davis, USA, and Z Pan, USDA-ARS, USA
- Introduction
- Microorganisms of concern in nuts and spices and related outbreaks
- Contamination pathways and persistence of microorganisms in nuts and spices
- Decontamination methods of nuts and spices
- Decontamination of spices
- The limitations of technologies and the challenges to adoption of technologies for decontamination of nut and spices
- Strategic issues, research and development priorities
- Sources of further information and advice
- References

**Microbial decontamination of juices**
*M D Danyluk, University of Florida, M E Parish, FDA/CFSAN Office of Food Safety, R M Goodrich-Schneider, University of Florida and R W Worobo, Cornell University, USA*
- Introduction
- Pathogens of concern and potential for contamination
- Current methods of juice decontamination
- Novel methods of juice decontamination
- Conclusion
- Future trends
- Sources of further information
- References

**Microbial decontamination of milk and dairy products**
*M Griffiths and M Walkling-Ribeiro, University of Guelph, Canada*
- Introduction
- Important pathogens and pathways of contamination in milk and dairy products
- Decontamination methods for milk and dairy products
- Novel techniques for the decontamination of milk and dairy products
- Conclusions and future trends
- Sources of further information and advice
- References

**PART 2 CURRENT AND EMERGING NON-CHEMICAL DECONTAMINATION METHODS**

**Advances in food surface pasteurisation by thermal methods**
*G Purnell and C James, The Grimsby Institute, UK*
- Introduction
- The principles of thermal surface pasteurisation
- Wet heat pasteurisation
- Dry heat pasteurisation
- Selecting the right method
- The limitations of technologies and the challenges to adoption of surface pasteurisation by thermal methods
- Concluding remarks and future trends
- Sources of further information and advice
- References

**Microbial decontamination of food by microwave (MW) and radio frequency (RF)**
*S R S Dev, McGill University, Canada, S L Birla, University of Nebraska, USA, G S V Raghavan, McGill University, Canada and J Subbiah, University of Nebraska, USA*
- Introduction
- Properties of microwave (MW) and radio frequency (RF) electromagnetic waves
- Dielectric Heating
- Radio frequency (RF) and microwave (MW) interactions with food constituents
- Dielectric system design and components
- Decontamination of foods by radio frequency (RF) and microwave (MW)
- Conclusions and future trends
- References

**Microbial decontamination of food by power ultrasound**
*B Zhou, H Lee and H Feng, University of Illinois at Urbana-Champaign, USA*
- Introduction
- Principles and technology
- Mode of inactivation by power ultrasound
Applications in food decontamination by power ultrasound
- Effects of power ultrasound on food quality
- Concluding remarks and future trends
- Sources of further information and advice
- References

Microbial decontamination of food by irradiation
C Sommers, USDA ARS, USA
- Introduction
- Types, sources, and units of ionizing radiation
- Regulations for food irradiation
- Toxicological safety of irradiated foods
- Microbial inactivation
- Consumer acceptance of irradiated foods
- Limitations and challenges of irradiation technology
- Conclusion and future trends
- Sources of further information and advice
- References

Microbial decontamination of food by ultraviolet (UV) and pulsed UV light
N M Keklik, Cumhuriyet University, Turkey, K Krishnamurthy, Illinois Institute of Technology and A Demirci, The Pennsylvania State University, USA
- Introduction to food decontamination by ultraviolet (UV) and pulsed UV light
- Fundamentals of ultraviolet (UV) and pulsed UV light
- Ultraviolet (UV) light technology
- Pulsed ultraviolet (UV) light technology
- Mechanisms of microbial inactivation in foods by ultraviolet (UV) and pulsed UV light
- Applications of ultraviolet (UV) and pulsed UV light for food decontamination
- Effects of ultraviolet (UV) and pulsed UV light on food quality
- Limitations and challenges
- Future trends
- Sources of further information and advice
- References

Microbial decontamination of food by high hydrostatic pressure
H Daryaei and V M Balasubramaniam, The Ohio State University, USA
- Introduction
- The high hydrostatic pressure (HPP) process
- Compression heating of pressure-transmitting fluids and food materials
- Microbial inactivation by high hydrostatic pressure (HPP)
- Food pasteurization & sterilization effects
- Applications of food decontamination by high pressure
- Conclusion and future trends
- Sources of further information and advice
- References

Microbial decontamination of food by pulsed electric fields
M Amiali, Ecole Nationale Superieure Agronomique, Algeria, and M Ngadi, McGill University, Canada
- Introduction
- Pulse electric field (PEF) technology
- Critical factors affecting food decontamination by pulsed electric fields (PEF)
- Mode of microbial inactivation in foods by pulsed electric fields (PEF)
- Application of food treatment by pulsed electric fields
- The limitations of technology and the challenges to adoption of pulsed electric fields (PEF) technology
- Food Safety of pulsed electric fields (PEF) processing
- Conclusions and future trends
Microbial decontamination of food by infrared (IR) heating  
*K Krishnamurthy, Illinois Institute of Technology, R Ramaswamy, Heinz North America, and S Jun, University of Hawaii, USA*

- Introduction
- Infrared heating equipment and design
- Application of (IR) in food decontamination
- Effectiveness of (IR) and ultraviolet (UV) irradiation on food safety and quality
- Conclusion and future trends
- Sources of further information and advice
- References

Microbial decontamination of food by non-thermal plasma  
*M Kong, Loughborough University, UK*

- Introduction
- Plasma based food decontamination: principles and mechanisms
- Capabilities and limitations of non-thermal plasma
- Selected applications and effect on food quality
- Concluding remarks and future trends
- Sources of further information
- References

PART 3 CURRENT AND EMERGING CHEMICAL DECONTAMINATION METHODS

Microbial decontamination of food using ozone  
*A S Chawla, D R Kasler, S K Sastry and A E Yousef, Ohio State University, USA*

- Introduction
- Ozone properties, generation, and decomposition
- Ozone measurement
- Units for expressing ozone concentration
- Mode of microbial inactivation by ozone
- Applications of ozone for food decontamination
- Ozone safety considerations and limitations
- Conclusion and future trends
- Sources of further information
- Acknowledgements
- References

Chlorine dioxide for microbial decontamination of food  
*V Trinetta, M Morgan, and R Linton, Purdue University, USA*

- Introduction
- Chlorine dioxide (ClO2) as a food decontamination technology: research updates
- Decontamination of fruits and vegetables
- The limitations and the challenges to adoption of the chlorine dioxide (ClO2) technology
- Conclusion and future trends
- Sources of further information and advice
- References

Electrolyzed oxidizing water for microbial decontamination of food  
*K-C Cheng, National Taiwan University, Taiwan and S R S Dev, K Bialka and A Demirci, The Pennsylvania State University, USA*

- Introduction
- Electrolyzed oxidizing water (EOW): principles and technology
- Mechanisms of microbial inactivation in foods using electrolyzed oxidizing water (EOW)
- Applications of electrolyzed oxidizing water (EOW) in food industry
- The limitations of the technology and the challenges to adoption of the technology
Conclusions and Future trends
Sources of future information and advice
References

Organic acids and other chemical treatments for microbial decontamination of food
A Lianou and K P Koutsoumanis, Aristotle University of Thessaloniki, Greece and J N Sofos, Colorado State University, USA
- Introduction
- Chemical decontamination of food
- Types of chemical treatments
- Mechanisms of microbial inactivation
- Applications of chemical treatments for specific food products
- Effects of chemical decontamination on food quality
- Potential concerns and risks associated with chemical decontamination
- Legislative aspects of chemical decontamination
- Future trends
- Sources of further information and advice
- References

Dense phase CO2 (DPCD) for microbial decontamination of food
M Balaban, University of Auckland, New Zealand, G Ferrentino and Spilimbergo, University of Trento, Italy
- Introduction
- Food decontamination using dense phase CO2 (DPCD): principles and technology
- Mechanisms of microbial inactivation
- Decontamination of liquid and solid foods
- Effects on food quality
- Future trends and recommendations
- Sources of future information and advice
- References

PART 4 CURRENT AND EMERGING PACKAGING TECHNOLOGIES AND POST-PACKAGING DECONTAMINATION

Packaging technologies and their role in food safety
M Lalpuria, R Anantheswaran and J Floros, Pennsylvania State University, USA
- Introduction
- Levels of packaging
- Role of packaging
- Packaging materials
- Formation of packages
- Packaging for various processed foods
- Package integrity
- Migration and sorption
- Current and future trends
- Sources of further information and advice
- References

Emerging methods for post-packaging microbial decontamination of food
H Neetoo, H Chen and D G Hoover, University of Delaware, USA
- Introduction
- Conventional thermal processing (CTP)
- Sous-vide processing (SVD)
- Microwave heating (MW)
- Infrared (IR) and Radiofrequency (RF) heating
- High hydrostatic pressure (HHP)
- Irradiation
- Pulsed light (PL) technology
- Active packaging
- Conclusion and future trends
- Sources of further information and advice
- References