



**5th INTERNATIONAL CONFERENCE  
PREDICTIVE MODELLING IN FOODS  
IC PMF 2007**

**September 16-19, 2007**

**ATHENS - GREECE**

**Fundamentals State of the Art and New Horizons**

**Conference Programme**

**Sunday, September 16<sup>th</sup>**

**14.00 Registration (14.00-18.00)**

**15.00 Session 1. A bird's eye view on predictive modelling in foods**

**15.00** Welcome addresses

**15.10** Predictive modeling of the past: A personal account  
**Constantin Genigeorgis**

**15.30 Key note lecture:** The future of predictive microbiology: innovative applications or great expectations  
**Tom McMeekin**

**16.10** Colonial growth of *Salmonella* resulting in auto-induction of acid tolerance response.  
**David Wilson, Yvan Le Marc, Siggers Elizabeth and Tim Brocklehurst.**

**16.30** A global approach to predict *Listeria innocua* growth at the surface of foods as a function of the media and process characteristics.  
**André Lebert, Isabelle Lebert, Stéphane Portanguen and Claude-Gilles Dussap.**

**16.50** Quantification of hurdles: predicting the combination of effects on the growth-no growth boundary.  
**Ronald Lambert and Eva Bidlas.**

**17.10** Temperature is the main factor governing the rate of non-thermal inactivation of vegetative bacteria.  
**Tom Ross, Donglai Zhang and Olivia McQuestin.**

**17.30 Poster Session A: Predictive modelling methodologies and New modelling techniques/approaches**

**18.30 Welcome Cocktail**

**Monday, September 17<sup>th</sup>**

**09.00 Session 2. Applications in quantitative microbiological risk assessment (I)**

**09.00 Key note lecture:** The evolution of Risk Analysis in food safety  
**Leon Gorris**

**09.40** Quantitative risk assessment for *Escherichia coli* O157:H7 in frozen ground beef patties consumed by young children in French households.  
**Marie Laure Delignette-Muller**, Marie Cornu and Nawel Bemrah.

**10.00** Application of predictive modelling techniques in industry: from food design up to risk assessment.  
**Jeanne-Marie Membre** and Ronald, J.W. Lambert.

**10.20-11.00 Coffee break**

**11.00 Session 3 (Parallel). Predictive modelling methodologies for (non)thermal microbial inactivation**

**11.00** Simulation intricacies associated with a Weibull-type model, developed based on microbial inactivation experiments under static conditions, when applied under dynamic conditions.  
Mieke Janssen, Anke Verhulst, Vasilis Valdramidis, Frank Devlieghere, Jan Van Impe and **Annemie Geeraerd**.

**11.20** Modular approach for modelling the non-thermal inactivation of *Listeria monocytogenes* and *Salmonella* Typhimurium  
**Louis Coroller**, Eric Mettler, Ivan Leguerinel, Dominique Thuault and Pierre Mafart.

**11.40** Modelling the inactivation of a bacterial spore population of heat sensitive and heat resistant spores  
**Ivan Leguerinel**, Alfredo Palop and Santiago Condon.

**12.00** Identification of non-linear microbial inactivation kinetics under dynamic conditions.  
**Vasilis Valdramidis**, Annemie Geeraerd, Kristel Bernaerts and Jan Van Impe.

**12.20** Development of the quasi-chemical model for the inactivation of pathogens and bacterial spores by high pressure and chemical sterilizing agents.  
**Florence Feeherry**, Christopher Doona and Edward Ross.

**11.00 Session 4 (Parallel). Predictive modelling methodologies for abiotic stresses during microbial growth**

**11.00** Modelling the vapour-phase antimicrobial activity of essential oils against a wide array of foodborne microorganisms.

**Laura Gutiérrez, Patricia López, Cristina Sánchez, Ramon Batlle and C. Nerín.**

**11.200** Prediction of pH and water activity of complex bacterial growth media containing electrolytes using UNIFAC model.

**André Lebert, Isabelle Lebert, Claude-Gilles Dussap, Stéphane Portanguen, Jean-Dominique Daudin and Tania Rougier.**

**11.40** Direct imaging based quantification of the growth dynamics of salt-stressed *Bacillus cereus*.

**Heidy M. W. den Besten, Colin Ingham, Roy Moezelaar, Marcel H. Zwietering and Tjakko Abee.**

**12.00** Towards a unified approach for modelling the effect of different levels of osmotic stress on the survival of *Listeria monocytogenes*.

**Panagiotis Skandamis, Antonia Gounadaki, Vasilis Valdramidis and George-John Nychas.**

**12.20** Combined effects of thermal treatment, pH and cinnamaldehyde on the viability of *Alicyclobacillus acidoterrestris* spores.

**Antonio Bevilacqua, Maria Corbo and Milena Sinigaglia.**

### **12.40-14.00 Lunch break**

## **14.00 Session 5. New horizons in shelf-life modelling and monitoring**

**14.00** Application and validation of the TTI based chill chain management system SMAS on shelf life optimization of vacuum packed fresh tuna slices.

Theofania Tsironi, **Eleni Gogou** and Petros Taoukis.

**14.20** Modelling pH and lactic acid production in a medium modified by a lactic bacterium growth. Application to set a biological TTI.

**Mariem Ellouze, Catherine Bonaiti, Olivier Couvert, Dominique Thuault and Renaud Vaillant.**

**14.40** Modelling of growth and histamine formation by *Morganella psychrotolerans*.

**Jette Emborg** and Paw Dalgaard.

**15.00** Development of a microbial Time Temperature Indicator (TTI) for monitoring microbiological quality of foods.

**Hariklia Vaikousi, Costas Biliaderis and Konstantinos Koutsoumanis.**

### **15.20-16.00 Coffee break**

## **16.00 Session 6 (Parallel). Predictive modelling methodologies in/on structured food/model systems**

**16.00** Modelling the outgrowth of *Clostridium perfringens* during the cooling of bulked meat.

**Yvan Le Marc, June Plowman, Clare F. Aldus, Marina Munoz-Cuevas, Jozsef Baranyi and Michael W. Peck.**

**16.20** Effect of pH, water activity and gel micro-structure, including oxygen profiles and rheological characterisation, on the growth kinetics of *Salmonella* Typhimurium.

**Tina Theys**, Annemie Geeraerd, Frank Devlieghere, Paula Moldenaers, David Wilson, Tim Brocklehurst and Jan Van Impe.

**16.40** *Listeria monocytogenes* growth in structured food: effect of population density.

**Nathalie Gnanou Besse**, Lena Barre, Alexandra Cauquil and Marie Cornu.

**17.00** Effect of food structure (type of growth), composition and microbial interaction on the growth kinetics of *L. monocytogenes*.

**Dimitra Dourou**, Anastasios Stamatiou, Konstantinos Koutsoumanis and George-John Nychas.

**17.20** Modeling the *Bacillus cereus* adherence on stainless steel surface as function of temperature, pH and time.

**Nelio Jose de Andrade**, Wilmer Edgard Luera Pena and Nilda de Fatima Ferreira Soares.

### **16.00 Session 7 (Parallel). Applications of predictive modeling to dairy products & processing**

**16.00** Web-based predictive models for optimisation of heating processes in small and medium-sized dairy enterprises.

**Maarten Schutyser**, Han Straatsma, Paula Keijzer, Peter de Jong, Maykel Verschueren and Petr Horak.

**16.20** Application of mathematical modelling in microbiological spoilage analysis and shelf-life determination of pasteurized cream.

**Niki Fasoulaki**, Efstathios Panagou and George-John Nychas.

**16.40** A predictive model for *Listeria monocytogenes* in dairy products.

**Adriana Lobacz** and Jozsef Baranyi.

**17.00** Modelling the competitive growth between *Listeria monocytogenes* and biofilm microflora of smear cheese wood shelves.

**Laurent Guillier**, Valerie Stahl, Bernard Hezard, Eric Notz and Romain Briandet.

**17.20** Modelling survival of *Listeria monocytogenes* during storage from 5 to 20°C in soft Greek traditional cheese.

**Virginia Stergiou**, Marios Mataragkas, Anna Lazaridou and George-John Nychas

### **17.40-18.30 Poster Session A: Predictive modelling methodologies and New modelling techniques/approaches**

### **20.30 Gala Dinner at Poseidon Temple, Sounio**

**Tuesday, September 18<sup>th</sup>**

**09.00 Session 8. Predictive modelling methodologies at individual cell level (I)**

**09.00 Key note lecture:** Microbial adaptation: continuously discrete or discretely continuous?

**József Baranyi**

**09.40** Modelling the individual cell lag time distributions of *Listeria monocytogenes* as a function of the physiological state and the growth conditions.

Jean-Christophe Augustin and **Laurent Guillier**.

**10.00** A study on the variability in the growth limits of individual cells and its effect on the behaviour of microbial populations.

**Kostas Koutsoumanis**.

**10.20-11.00 Coffee break**

**11.00 Session 9 (Parallel). Applications in quantitative microbiological risk assessment (II)**

**11.00** Microbial quantitative exposure assessment using hierarchical Bayesian modelling and second-order Monte Carlo simulation.

**Amelie Crepet**, Valerie Stahl and Frederic Carlin.

**11.20** Behaviour of *Clostridium perfringens* in the gastro-intestinal tract in relation to food borne disease.

**Lucas Wijnands** and Anne Marie Pielat.

**11.40** Implications of FSO scenarios for the broiler chicken supply chain.

**E.D. Asselt**, H.J. Van der Fels-Klerx, S. Tromp and H. Rijgersberg.

**12.00** Use of Monte Carlo simulation in risk assessment of *Salmonella* on shells of eggs.

Jane Sutherland, **Pilar Botey-Salo** and Alan Varnam.

**12.20** An integrated risk assessment of patulin in apple juices throughout the food chain.

**Katleen Baert**, Bruno De Meulenaer, Achour Amiri, Johan Debevere and Frank Devlieghere.

**12.40** Semantic annotation of Web data applied to risk in food.

**Gaelle Hignette**, Patrice Buche, Olivier Couvert, Juliette Dibie-Barthelemy, David Doussot, Ollivier Haemmerle, Eric Mettler and Lydie Soler.

## **11.00 Session 10 (Parallel). Presentations of predictive modelling softwares**

**11.00** Use of USDA-Pathogen Modeling Program and the Predictive Microbiology Information Portal

**Vijay Juneja**

**11.30** ComBase: an integrated database and predictor of microbial responses to food environments

**József Baranyi**

**11.50** Seafood Spoilage and Safety Predictor (SSSP)

**Paw Dalgaard**

**12.10** Sym'Previus : system for prediction of processes and environments impacts on microorganisms in food.

**Olivier Couvert and Florence Postollec**

**12.30** Software Tools for Food Safety Decisions: Risk Ranger and the Refrigeration Index

**Tom Ross**

**12.50** GInaFiT. Revealing the shape of microbial survivor curves to assess processing performance via the number of log reductions concept

**Annemie Geeraerd**

## **13.00-14.00 Lunch break**

## **14.00 Session 11. Predictive modelling methodologies at individual cell level (II)**

**14.00** Development and assessment of growth/no growth models incorporating the effect of cell density on the growth probability of *Listeria monocytogenes*.

Kristel P.M. Gysemans, An Vermeulen, **Kristel Bernaerts**, Annemie H. Geeraerd, Johan Debevere, Frank Devlieghere and Jan F. Van Impe.

**14.20** Modelling the effect of acid adaptation on the single-cell probability of growth of *Salmonella* Enteritidis and *Listeria monocytogenes* in response to pH, water activity and temperature.

**Panagiotis Skandamis.**

**14.40** Effects of non-inhibitory concentrations of selected fatty acids on the lag time distribution of *Staphylococcus aureus* single cells.

**Sado Kamdem Sylvain Leroy**, Carmen Pin, Maria Elisabetta Guerzoni and Jozsef Baranyi.

**15.00** Modelling the effect of sub-lethal temperatures on the subsequent germination and outgrowth stages constituting the individual lag times of spores of *Bacillus subtilis*.

**Johannes Smelt**, Ad. P. Bos and Stanley Brul.

## **15.20-16.00 Coffee break**

## **16.00 Session 12 (Parallel). Methodological developments for predictive modeling and risk assessment**

**16.00** Quantification of the adaptive salt stress response of *Bacillus cereus*.

**Heidy M.W. den Besten**, Marios Mataragas, Roy Moezelaar, Tjakko Abee and Marcel H. Zwietering.

**16.20** Accurate estimation of cardinal temperature parameters of *Escherichia coli* from dynamic experiments: what can we gain from optimal dynamic experiment design?

**Eva Van Derlinden**, Kristel Bernaerts and Jan F. Van Impe.

**16.40** Validation and performance of predictive modelling in foods: Use of prediction confidence bands.

Louis Coroller and **Jean-Pierre Gauchi**.

**17.00** A global Bayesian approach for Quantitative Risk Assessment (QRA) from farm to illness. Application to campylobacteriosis through broiler.

**Isabelle Albert**, Emmanuel Grenier, Jean-Baptiste Denis and Judith Rousseau.

## **16.00 Session 13 (Parallel). Applications of predictive modeling in meat products/processing**

**16.00** A predictive model for growth of *L. monocytogenes* in meat products with seven different hurdles variables.

**Annemarie Gunvig**, Claus Borggaard, Flemming Hansen, Tomas Jacobsen and Jesper Blom-Hanssen.

**16.20** Probabilistic modelling of *Pseudomonas fluorescens* behaviour on surfaces in meat processing premises.

Sophie Peneau, Brigitte Carpentier and **Marie Cornu**.

**16.40** Combining deterministic models and Monte Carlo analysis for process optimization in the cooked meat products industry.

**Athina Esveld-Amanatidou** and Caroline Verhagen

**17.00** The comparative study of growth rate, lag phase and doubling time of *E. coli* O157:H7 in commercial chicken soup extract affected by some essential oils (*Zataria multiflora*, *Carvi carum* and *Mentha piperita*).

**Ali Fazlara**, Hosein Najafzadeh and Elnaz Lak.

## **17.20-19.00 Poster Session B: Applications of predictive modelling**

### **17.20-19.00 Predictive modelling software demonstrations**

- USDA-Pathogen Modeling Program and Predictive Microbiology Information Portal
- ComBase
- Seafood Spoilage and Safety Predictor (SSSP)
- SymPrevius
- Risk Ranger
- Refrigeration Index

**20.30 Conference Dinner**

**Wednesday, September 19<sup>th</sup>**

**09.00 Session 14. New horizons involving systems biology**

**09.00 Key note lecture:** Microbial Systems Biology; new frontiers open to Predictive Microbiology

**Stanley Brul**

**09.40** Application of Network science to describe the changes in gene expression during the lag time of *Escherichia coli*.

**Carmen Pin.** and József Baranyi

**10.00** Quantitative evaluation of meat spoilage.

**George-John Nychas** and Panagiotis Skandamis.

**10.20-11.00 Coffee break**

**11.00 Session 15 (Parallel). Applications of predictive modeling in salads, sourdough & fish and seafood products**

**11.00** Evaluation of the microbial safety and stability of salads and sauces based on growth/no growth models for different micro-organisms.

**An Vermeulen**, Frank Devlieghere, Kristel Bernaerts, Annemie H. Geeraerd, Kristel P.M. Gysemans, Jan F. Van Impe and Johan Debevere.

**11.20** Modelling of the functionalities of a novel *Lactobacillus fermentum* sourdough starter strain.

Gino Vrancken, Tom Rimaux, Luc De Vuyst and **Frederic Leroy**.

**11.40** Development and field validation of a shelf-life model for emulsified Greek appetizers.

**Panagiotis Skandamis**, Konstantinos Karavasilis, George-John Nychas and Eleftherios Drosinos.

**12.00** Predicting growth of lactic acid bacteria and *Listeria monocytogenes* in lightly preserved seafood – a product-oriented modelling approach.

**Ole Mejlholm** and Paw Dalgaard.

**12.20** Optimization of shelf life distribution of frozen shrimp based on modeling and TTI monitoring.

**Theofania Tsironi**, Maria Giannakourou, Efimia Dermesonlouoglou and Petros Taoukis.



**12.40** Development and assessment of a shelf life prediction system for cultured Tilapia.

Zhong Xu, Quanyou Guo, **Xianshi Yang**.

### **11.00 Session 16 (Parallel). Applications of predictive modeling in food products & drinks**

**11.00** Microbial interactions and equilibrium during wine elaboration - relationship with the wine quality.

**Vincent Renouf**

**11.20** Predictive modeling for the recovery of *Listeria monocytogenes* on sliced cooked ham after high pressure processing.

**Shige Koseki** and Kazutaka Yamamoto.

**11.40** Modeling high hydrostatic pressure inactivation kinetics of pectinmethylesterase of citrus fruits.

**George Katsaros**, Basiliki Sidosi, Theodora Panagiotou, Aggeliki Polydera and Petros Taoukis.

**12.00** Effect of ethanol vapours on inactivation of fungal spores.

**Dantigny Philippe**, Thien Dao, Julien Dejardin and Maurice Bensoussan.

**12.20** Development of a probabilistic lag model to predict the fate of *Bacillus cereus* spores in heat-treated chilled foods (REFEDs).

**Jeanne-Marie Membre**, Denis Kan-King-Yu and Clive Blackburn.

**12.40** A logistic approach to assess the suitability of aroma compounds to improve microbiological stability of soft drinks.

**Nicoletta Belletti**, Sylvain Sado Kamdem, Francesca Patrignani, Rosalba Lanciotti and Fausto Gardini.

### **13.00-14.00 Lunch break**

### **14.00 Session 17. A last bird's eye view ...**

**14.00** What happens to the diversity of bacterial pathogens along a processing chain? The example of *Bacillus cereus* in cooked and pasteurised vegetable purées.

**Anne-Laure Afchain**

**14.20** Evolving from high through low uncertainty risk assessments using kinetic, stochastic and fault tree modeling.

**Hein van Lieverloo**, Martijn Fox, Maarten Schutyser, Meike te Giffel and Peter de Jong.

**14.40** Variability and uncertainty in the *Campylobacter* load corresponding to the consumption of cooked poultry products in the United Kingdom.

**Pradeep Malakar**, Gary Barker, Son Radu and Chai Lay Ching.

**15.00** Risk assessment of *Salmonella* spp. in cocoa products.

**John Rossis**, Panagiotis Skandamis and George-John Nychas.

**15.20** Optimising food process and formulation through Sym'Previus, Managing of the food safety

**Olivier Couvert**, Patrice Buche, Frederic Carlin, Louis Coroller, Catherine Denis, Emmanuel Jamet, Eric Mettler, Anthony Pinon, Valerie Stahl, Veronique Zuliani and Dominique Thuault.

## **15.40-17.00 Poster Session B: Applications of predictive modelling**

### **17.00 Closing Event**

## **POSTERS**

### **Predictive modelling methodologies**

Growth interaction between *Staphylococcus aureus* and lactic acid bacteria during fermentation of milk.

Lubomir Valik, Alzbeta Medvedova, Barbora Bajusova and Denisa Liptakova.

Evolutionary combined neural networks for modelling the growth boundaries of a five strain *Staphylococcus aureus* cocktail against temperature, pH and water activity.

Antonio Valero, Fernando Perez-Rodriguez, Elena Carrasco, Cesar Hervas, Juan C. Fernandez, Pedro Gutierrez, Gonzalo Zurera and Rosa M. Garcia Gimeno.

Towards a biological process model for the behavior of food-borne pathogens in the gastro-intestinal tract.

Annemarie Pielaat and Lucas Wijnands.

A new algorithm for calculating thermal processes related to non-log-linear survival curves.

Pierre Mafart and Louis Coroller.

Modeling shelf-life of refrigerated chicken meat products in aerobic packaging.

Marcello Trevisani, Graziella Ziino, Christian Scarano and Silvia Alonso Alvarez.

Evolution of biomass distribution during bacterial lag phase through flow cytometry, particle analysis and Individual-based Modelling.

Clara Prats Soler.

Predictive model for growth of *Clostridium perfringens* at temperatures applicable to cooling of cooked uncured beef and chicken.

Vijay Juneja, Harry Marks, Lihan Huang and Harshvardhan Thippareddi.

Variability of the *Listeria innocua* and *Enterococcus faecalis* inactivation in ham by irradiation.

Juan Aguirre García, Rodriguez Maria Rosa and Garcia de Mingu Gonzalo.

Baseline assessment of the microbial contamination of Lori cheese sold in Yerevan markets.

Nune Truzyan.

Performance evaluation of secondary models for prediction of growth rate of *Salmonella* in decontaminated fresh pork.

Tina Hansen, Yvonne Kampmann, Bjarke Christensen and Soren Aabo.

The survey of growth and toxigenesis of *Clostridium botulinum* type A under effect of multivariant pH, salt, temperature and time of storage in B.H.I model.

Zohreh Mashak.

Determination and quantification of microbiological and chemical changes in yogurt using machine vision system and evaluation of collected data using artificial neural network during storage.

Aytul Sofu, Necla Demir and Fatma Yesim Ekinci.

Designing experiments for microbial inactivation kinetics studies

Maria Gil, Teresa Brandao and Cristina Silva.

Quantitative studies on the inhibition of the growth of *Escherichia coli* and *Listeria monocytogenes* by lactic acid bacteria.

Bernadette Klotz, Catalina Aguilar and Consuelo Vanegas.

INDISIM-YEAST, a simulator for individual-based modelling of yeast metabolism and process dynamics in asynchronous batch fermentations.

Marta Ginovart and Anna Gras, Rosa Carbo.

Modelling of surface temperature during inactivation of bacteria by a jet of superheated steam.

Stephane Portanguen and Alain Kondjoyan.

Variability of the *Listeria innocua* and *Enterococcus faecalis* inactivation in milk by heating treatment.

Gonzalo Garcia de Fernando, Maria Rosa Rodriguez and Juan Aguirre.

The use of flow cytometry and particle size analysis in the Individual-based Model INDISIM-YEAST, a simulator of yeast populations.

Marta Ginovart, Rosa Carbo, Anna Gras and Josep Vives-Rego.

Modeling the interface growth/no growth of *Alicyclobacillus acidoterrestris* CRA 7152 in orange juice as a function of pH, temperature, Brix and nisin concentration.

Wilmer Edgard Luera Pena and Pilar Rodriguez de Massaguer.

Primary growth modeling of *Saccharomyces cerevisiae* in co-culture with *Lactobacillus fermentum* in sugar-cane must.

Veronica Ortiz Alvarenga and Pilar Rodriguez de Massaguer.

Use of Monte Carlo simulation to determine fate of *Salmonella* Enteritidis during fermentation of cassava.

Jane Sutherland, Amara Anyogu and Alan Varnam.

Modelling and predictions from non isothermal heating to control *Listeria monocytogenes* in foods.

Marina Munoz, Leymaya Guevara, Alfredo Palop, Paula M. Periago and Pablo S. Fernandez.

Control of *Listeria monocytogenes* cells combining heat and plant essential oils and description through frequency distributions.

Leymaya Guevara, Marina Munoz, Paula Periago, Alfredo Palop and Pablo Fernandez.

Validation of a model for lactic acid induced interaction in structured media: effect of  $\text{KH}_2\text{PO}_4$ .

Michael Antwi, Kristel Bernaerts, Jan Van Impe and Annemie Geeraerd.

Growth probability of *Listeria monocytogenes* and classification of pork meat products.

Jean-Christophe Augustin, Veronique Zuliani and Pascal Garry.

Quorum Sensing – can be a variable for modeling microbial behavior?

Dimitra Dourou, Christos Michaelidis, Virginia Stergiou, Panagiotis Skandamis and George-John Nychas.

Evaluation of mathematical models for microbial growth of *Enterobacter sakazakii*.

Maria Consuelo Pina Perez, Dolores Rodrigo Aliaga, Esther Buesa, Maria Jesus Pagan and Antonio Martinez Lopez.

### **New modelling techniques/approaches**

Modelling the onset of browning during mushroom storage (*Agaricus bisporus* spp.) using Local Standard Deviation (LSD).

Leixuri Aguirre, Jesus Frias, Catherine Barry-Ryan and Helen Grogan.

Computing optimal dynamic experiments for model calibration in predictive microbiology.

Eva Balsa-Canto, Antonio A. Alonso and Julio R. Banga.

Integrated modelling of food process and bacterial behaviour: application for predicting the evolution of *Listeria monocytogenes* contamination during delicatessen processing.

Veronique Zuliani, Isabelle Lebert, Pascal Garry, Jean Luc Vendeuvre and Andre Lebert.

Accurate estimation of cardinal temperature parameters of *Zygosaccharomyces bailii* from dynamic experiments.

Eva Van Derlinden, Kristel Bernaerts and Jan F. Van Impe.

Neuro-fuzzy modelling for the growth rate of *Aspergillus carbonarius*.

Efstathios Panagou, Chrysoula Tassou, Naresh Magan and Vassilis Kodogiannis.

Automatic monitoring the redox potential for growth /death modelling and data gathering on bacterial contamination with low cell numbers.

Oliver Reichart, Jozsef Farkas, Katalin Szakmar, Judit Beczner, Eva Andrassy and Ildiko Bata-Vidacs.

Influence of water activity on the distribution of the germination time amongst a population of fungal spores.

Philippe Dantigny, Daniela Judet and Maurice Bensoussan.

Flow cytometry: a new rapid enumeration method in predictive microbiology.

Fernando Perez Rodriguez, Rocio Castro Alvarez, Antonio Valero, Elena Carrasco, Rosa M. Garcia Gimeno and Gonzalo Zurera.

### **Applications of predictive modeling**

A stochastic modeling approach for taking into account spoilage in Risk Assessment: Application for *Escherichia coli* O157:H7 in ground beef.

Kostas Koutsoumanis.

Statistical distributions describing heterogeneous contamination in a dry food product. Dijkhoff, A.A. Orphanides, M.W. Reij, L.G.M. Gorris, M.H. Zwietering

Behavior of foodborne pathogens in Teewurst raw spreadable sausage.

Dimitra Dourou, Anna Porto-Fett, Brad Shoyer and John Luchansky.

Growth and inactivation of *Escherichia coli*, *Listeria monocytogenes* and *Yersinia enterocolitica* in fermented sausages.

Mats Lindblad and Roland Lindqvist.

Modeling of migration of volatile compounds from cap-liners into liquid food via package headspace.

Gholamhassan Asadi, S.Mohammad Mousavi and Stephane Desobry.

Modelling pathogen thermal inactivation potential of two industrial processes for precooked meat patties: the case of *Listeria monocytogenes*.

Lucia Vannini, Sylvain Leroy Sado Kamdem, Federico Ferioli, Caboni Maria Fiorenza and Guerzoni Maria Elisabetta.

Predictive modelling for quantitative risk assessment in the food industry.

Enda Cummins, Francis Butler, Ronan Gormley and Nigel Brunton.

Validation of predictive models for growth of *Listeria monocytogenes* in cooked meat products and determination of product safe shelf life.

Andras Sebok, Erika Horvath, Csaba Baar, Judit Gasparikne dr. Reichardt and Szilard Percsi.

Kinetic study of the activity of *S. thermophilus* aminopeptidases subjected to high hydrostatic pressure for optimization of Feta cheese ripening.

George Katsaros, Marianna Giannoglou and Petros Taoukis.

Assessment of the influence of low pressure and modified atmospheres on the microflora of beef cuts stored under in rigid container systems.

Peter Paulsen, Frans Smulders and Susanne Giefing.

Modelling the biofilm formation of *Pseudomonas fluorescens* to marble, granite and stainless steel as function of time and temperature.

Marcilia Santos Rosado, Nelio Jose de Andrade, Wilmer Edgard Luera Pena, Roberta Torres Careli and Nilda de Fatima Ferreira Soares.

Assessment of the effect of temperature, relative humidity and strain-to-strain variability *Listeria* spp. growth kinetics under refrigerated state.

Jesus Maria Frias Celayeta, Caroline Garvan, Isabelle Lebert, Nissreen Abu-Ghannam, Philippe Baucour and Andre Lebert.

Predictive modeling of dough quality parameters based on the single kernel characterisation system.

Lukasz Pietrzak and Bernard Baum.

Extending shelf life of cooked, cured meat product by the addition of sodium chloride, sodium lactate and sodium di-acetate.

Marios Mataragas, Athanasios Tornaros, Panagiotis Skandamis and Eleftherios Drosinos.

A preliminary assessment of prevalence of *Salmonella* spp. during pork slaughter in the Republic of Ireland.

Ursula Gonzales Barron, Donal Bergin, Francis Butler and Deirdre Prendergast.

The Opti.Form *Listeria* Control Model: a widely used tool to calculate the levels of lactate and diacetate required to retard the growth of *Listeria monocytogenes* in cured meat and poultry products.

Diana Visser, Taco Wijtzes, Harmen Kroon, Lonneke van Dijk, Edwin Bontenbal and Frans Rombouts.

Can food industry rely on predictive microbiology?

Eric Mettler, Soredab, Louise Perrier and Segolene Henri-Dubernet.

Evaluation and enumeration of Enterococci in Iranian traditional ice-cream with reference method and its correlation with Impedance-splitting method and designing their mathematical pattern.

Ali Fazlara, Siavash Maktabi and Ashrafossadat Noori.

Use of the Weibull distribution to model the heat inactivation of *Alicyclobacillus acidoterrestris* exposed to non-isothermal heat treatments.

Raquel Conesa, Pablo Fernandez and Alfredo Palop.

Predictive modelling of the dietary intake and bio-availability of  $\beta$ -glucan in bread.

Enda Cummins.

Kinetic models for *Pediococcus damnosus* survival during high pressure treatment.

Efstathios Panagou, Chrysoula Tassou, Fotis Samaras, John Arkoudelos and Constantinos Mallidis.

Application of a multilayer perceptron neural network to simulate the growth profile of lactic acid bacteria starter cultures in Spanish-style green olive fermentation.

Efstathios Panagou, Chrysoula Tassou, Eleftherios Saravanos and George-John Nychas.

Computer simulation of water activity in food products.

Olivier Couvert, Dominique Thuault and Marc LeMaguer.

Modelling the effect of enterocins A & B combined with lactate and EDTA at different temperatures on *Salmonella* growth response.

Sara Bover-Cid.

Potential pathogen growth during smoking of traditional Portuguese fermented meat products using predictive modelling tools.

Isabel Campelos, Paul Gibbs and Paula Teixeira.

Lag time estimation using turbidity measurements.  
Els Peters, Martine Reij, Leon Gorris and Marcel Zwietering.

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