ELSEVIER
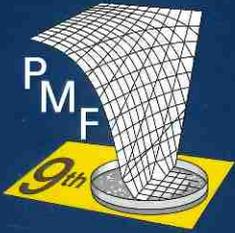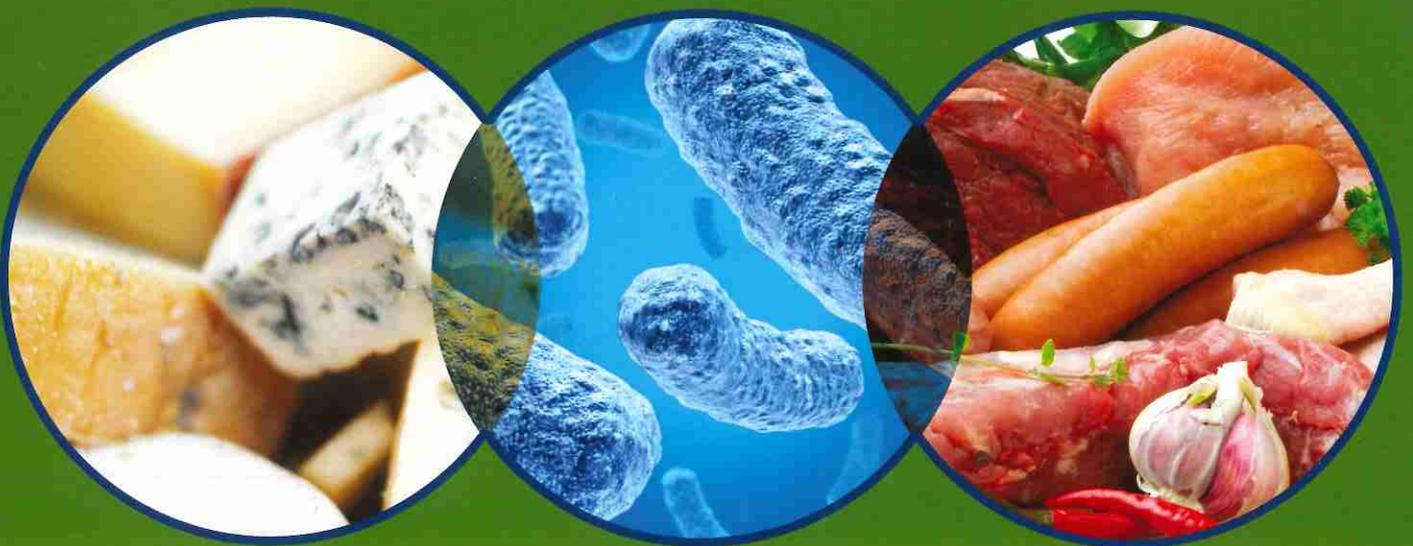
ICPMF**9**

International Conference on
Predictive Modelling in Food
Rio de Janeiro, Brazil   8-12 September 2015

Program

www.icpmf9.com

Title:

Modelling and validation of performance of *Listeria monocytogenes* wild type and stress resistant variants in simulated food chains

Authors & affiliations:

Karin I. Metselaar[1,2], Heidy M.W. den Besten[2], Tjakko Abee[1,2], Marcel H. Zwietering[1,2]
[1]Top Institute Food & Nutrition, the Netherlands, [2] Wageningen University, the Netherlands

Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

The dynamic response of pathogens to environmental changes depends on the behaviour of individual cells within the population. Exposure of *L. monocytogenes* to different stress conditions has been shown to result in selection of a variety of stable resistant variants. This population diversity allows for growth and survival of the population under a wide range of environmental conditions with specific fitness and robustness parameters considered a trade-off; a variant may have an advantage under one condition, while this might be a disadvantage under other conditions. Therefore, the types of variants and their relative contributions within the WT population will depend on the environmental conditions encountered by the population. This study aims to evaluate the effect of environmental conditions on the composition of the *L. monocytogenes* populations and how dynamic conditions affect the fraction of stress resistant variants within the population. Growth parameters were obtained for WT and a set of eight acid resistant *L. monocytogenes* variants. A gamma model was used to estimate the growth behaviour under combined mild stress conditions (temperature, water activity and pH). Also a set of inactivation parameters was determined (heat and acid). This set of robustness and fitness parameters of WT and variants was used to model their performance in simulated food chains. Predictions were validated by qPCR in which WT and variant were distinguished from each other by specific primers, designed on an *rpsU* mutation in the variant. With this method, a variant fraction as low as 10^{-5} could be identified correctly in a WT population. This study provided more insight in the conditions which can select for variants, which is an important step in control of these stress resistant subpopulations in industrial settings. It also highlights the potential persistence of stress resistant variants in food processing environments and consequential impact on food safety.

Friday 11 September 2015	
Room	Louvre I & II
08:15-10:00	SESSION 9: Modelling microbial growth under stress, impact of stress on recovery of analytical methods, impacts of stress on risk and spoilage, persistence of microorganisms in the environment and transference to foods
Session Chair	Jozsef Baranyi, Ph.D.; Institute of Food Research, United Kingdom
08:15-08:45	[KYN08] Quantifying the growth potential of a bacterial population under stress conditions - Implications for predicting risk Jozsef Baranyi, Institute of Food Research, UK
08:45-09:00	[O09.01] Adaptive response to acetic acid impacts on lag time distribution, growth /no-growth boundaries and inactivation rate of Bacillus weihenstephanensis N. Desriac[1], A. Cohan[1,2], V. Huchet[1], I. Leguerinel[2], F. Postollec[1], D. Sohier[1], L. Coroller*[2] ,[1]ADRIA - UMT14.01 SPORE-RISK, Food Technology Institute, Z.A. de Creac'h Gwen, France, [2]Université de Brest, EA3882, Laboratoire Universitaire de Biodiversité et Ecologie Microbienne, UMT14.01 SPORE-RISK, France
09:00-09:15	[O09.02] Modeling biofilm formation by Staphylococcus aureus challenged with sub-inhibitory concentrations of the essential oil from Origanum vulgare L. M. Magnani*[1], D. Schaffner[2], J.B.S. Rodrigues[1], N. Targino[1], E.L. Souza[1] ,[1]Federal University of Paraiba, Brazil, [2]The State University of New Jersey, USA
09:15-09:30	[O09.03] Modelling and validation of performance of Listeria monocytogenes wild type and stress resistant variants in simulated food chains K.I. Metselaar*[1,2], H.M.W. den Besten[1], T. Abee[1,2], M.H. Zwietering[1,2] ,[1]Wageningen University, The Netherlands, [2]Top Institute Food and Nutrition, The Netherlands
09:30-09:45	[O09.04] Assessing the capacity for survival, growth and acid adaptive response of Listeria monocytogenes during storage of various cheeses and subsequent simulated digestion A.E. Kapetanakou*, M.A. Gkerekou, E.S. Vitzilaiou, P.N. Skandamis ,Agricultural University Of Athens, Greece
09:45-10:00	[O09.05] A kinetical model to describe the growth and the sporulation of Bacillus subtilis E. Gauvry*, A.G. Mathot, O. Couvert, I. Leguérinel, L. Coroller, Laboratoire Universitaire de Biodiversité et Ecologie Microbienne, France
Room	Versailles Room
10:00-10:30	Coffee-break and Poster Session II
Room	Louvre I & II
10:30-12:00	SESSION 10: Modelling applied to viruses and protozoan pathogens
Session Chair	Prof. Donald W. Schaffner, Ph.D.; Rutgers - The State University of New Jersey, USA
10:30-11:00	[KYN09] Modeling risks associated with virus and protozoan pathogens in foods Prof. Donald W. Schaffner, The State University of New Jersey, USA
11:00-11:15	[O10.01] Modelling the microbiological risk of Salmonella spp. and Listeria monocytogenes in potato and chicken salad S.G. Manios*[1], L. Diamanti[1], G. Plati[1], I. Leguérinel[2], P.N. Skandamis[1] , [1]Agricultural University of Athens, Greece, [2]Universite de Brest, France
11:15-11:30	[O10.02] How to decide processing standards for the processing of beef meat intended to be eaten raw S. Igimi*, H. Asakura, Y. Okada, Y. Momose, S. Yamamoto, K. Fumiko et al, National Institute of Health Sciences, Japan
11:30-11:45	[O10.03] Understanding the risk of Listeria monocytogenes in retail delicatessens R. Pouillot*[1], D. Gallagher[2], S. Dennis[1], J. Kause[3] ,[1]Food and Drug Administration, USA, [2]Virginia Tech, USA, [3]Food Safety Inspection Service, USA
11:45-12:00	[O10.04] Process risk model for Salmonella and chicken parts T.P. Oscar, USDA, ARS, USA
Room	Versailles Room
12:00-14:00	Lunch and Poster Session II