

PEC2.55 Growth Inhibition of *Listeria monocytogenes* in semi-hard gouda cheese; establishing relevant determinants for a risk assessment

E Wemmenhove (1), I Stampelou (1), M Fox (1), JAM van Lieverloo (1), ACM van Hooijdonk (2), MH Zwietering (3), Marjon HJ Wells-Bennik (1)

(1) NIZO food research, The Netherlands

(2) Wageningen University, Department Product Design and Quality Management, The Netherlands

(3) Wageningen University, Food Microbiology Laboratory, The Netherlands

Semi-hard Gouda cheese produced from pasteurised milk is considered a safe product with regard to *Listeria monocytogenes*; a previous challenge test showed that growth of *L. monocytogenes* is not supported. The pH of the product is between 5.2 and 5.4, and the Aw is 0.94 to 0.96, which indicates that additional antimicrobial effects play a role in growth suppression of listeria. The aim of the current study is to investigate the impact of inhibiting factors including organic acids, pH and competitive flora on survival and growth of *L. monocytogenes* and integration of these data in a risk assessment.

Methods: The MICs (minimal inhibitory concentrations) of undissociated organic acids (lactic, acetic, propionic and citric acid) for growth of individual and combinations of *L. monocytogenes* strains (dairy strains as well as reference strain Scott A) have been determined in culture media, using pH and concentration ranges which are relevant for semi-hard cheese. Additionally, challenge tests in microscale cheeses have been performed to assess the effects of organic acid, pH, competitive flora and salt on growth inhibition of *L. monocytogenes*.

Results: The concentrations of organic acids in combination with the pH determine the concentrations of undissociated organic acids in semi-hard Gouda cheese. Our analysis showed that lactic and propionic acid are the most effective growth inhibitors of *L. monocytogenes* in semi-hard Gouda cheese; acetic and citric acid contribute less to growth inhibition. Preliminary results from cheese microscale experiments show no outgrowth of *L. monocytogenes* during ripening.

Discussion: Data obtained on growth inhibition of *L. monocytogenes* due to organic acids have been implemented in growth models for *L. monocytogenes* in Gouda cheese. The use of microscale cheeses in which a number of additional inhibiting factors were varied (salt, competitive flora) is a valuable tool for model validation. Obtained data, including the combined effect of undissociated organic acids, are integrated in a risk assessment.