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FSSP v. 5.0 – A NEW SOFTWARE WITH PREDICTIVE MODELS FOR A RANGE OF DAIRY PRODUCTS

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Introduction: Food Spoilage and Safety Predictor (FSSP) v. 4.0 from 2014 contained a growth and growth boundary model for *Listeria monocytogenes* in chilled seafood and meat products. This extensive model, including the effect of 12 environmental factors, has contributed to innovation, reformulation and documentation of safety for a wide range of seafood and meat recipes, including products with reduced sodium/salt content. The model has found little application for dairy products as its range of applicability was limited to pH ≥ 5.6 and did not included the inhibitory effect of dairy specific ingredients such as nisin and phosphate melting salts. FSSP v. 5.0 from 2019 has been developed to predict growth of *L. monocytogenes* in a range of dairy products.

Methodology: Three new *L. monocytogenes* growth and growth boundary models, including the effect of respectively four, six and 11 environmental factors, were developed and validated to include the inhibitor effect of pH ≥ 4.6, mono-, di- and tri-phosphate melting salts and nisin in cheese. Separately, ten available *L. monocytogenes* models were evaluated with literature data for growth and survival of the pathogen in cheese (n=319). Two of these models were successfully validated to predict growth of *L. monocytogenes* in cheeses at constant and dynamic conditions including changes in temperature, pH, lactic acid concentration and water activity during storage.

Results: FSSP v. 5.0 includes models to predict the growth potential for *L. monocytogenes* in (i) chemically acidified and cream cheese with pH ≥ 4.6; (ii) processed cheese with mixtures of phosphate melting salts and residual concentrations of nisin A; (iii) smear cheese (DL-culture) and (iv) cheese in brine (O-culture). In addition previously developed models for growth of *L. monocytogenes*, lactic acid bacteria and psychrotolerant pseudomonads in cottage cheese and milk were included in FSSP v. 5.0.

Conclusions and relevance: Extensive *L. monocytogenes* growth models specifically validated for dairy products and included in FSSP v. 5.0. This new software is likely to contribute to future product development, reformulation or risk assessment of dairy products in the same way that FSSP v. 4.0 has been used successfully for seafood and meat products (http://fssp.food.dtu.dk).