Modelling and predicting growth of psychrotolerant pseudomonads in milk and cottage cheese - DTU Orbit (10/11/2019)

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Mathematical models were developed and evaluated for growth of psychrotolerant pseudomonads in chilled milk and in cottage cheese with cultured cream dressing. The mathematical models include the effect of temperature, pH, NaCl, lactic acid and sorbic acid. A simplified cardinal parameter growth rate model was developed based on growth in broth. Subsequently, the reference growth rate parameter μref25°C-broth of 1.031/h was calibrated by fitting the model to a total of 35 growth rates from cottage cheese with cultured cream dressing. This resulted in a μref25°C-cottage cheese value of 0.621/h. Predictions from both growth rate models were evaluated by comparison with literature and experimental data. Growth of psychrotolerant pseudomonads in heat-treated milk (n=33) resulted in a bias factor (Bf) of 1.08 and an accuracy factor (Af) of 1.32 (μref25°C-broth), whereas growth in cottage cheese with cultured cream dressing and in non-heated milk (n=26) resulted in Bf of 1.08 and Af of 1.43 (μref25°C-cottage cheese). Lag phase models were developed by using relative lag times and data from both the present study and from literature. The acceptable simulation zone method showed the developed models to successfully predict growth of psychrotolerant pseudomonads in milk and cottage cheese at both constant and dynamic temperature storage conditions. The developed models can be used to predict growth of psychrotolerant pseudomonads and shelf life of chilled cottage cheese and milk at constant and dynamic storage temperatures. The applied methodology and the developed models seem likely to be applicable for shelf life assessment of other types of products where psychrotolerant pseudomonads are important for spoilage.