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DEVELOPMENT AND VALIDATION OF EXTENSIVE GROWTH AND GROWTH BOUNDARY MODELS FOR PSYCHROTOLERANT PSEUDOMONADS IN SEAFOOD, MEAT AND VEGETABLE PRODUCTS

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Abstract Content: Extensive growth and growth boundary models were developed and validated for psychrotolerant pseudomonads growing in seafood, meat and vegetable products. The new models were developed by expanding an existing cardinal parameter-type model for growth of pseudomonads in milk (Martinez-Rios *et al.*, Int. J. Food Microbiol. 216. 110-120, 2016). MIC-values for acetic-, benzoic- and citric acids were determined in broth and terms modelling their antimicrobial effect were added to the model. Cardinal parameter values for CO₂ and a_w were obtained from literature. The new model included 9 environmental parameters and their interactive effects. It was successfully validated using 319 growth rates (μ_{max} -values) for psychrotolerant pseudomonads in seafood and meat products. These data from literature (n=291) or own experiments (n=28) resulted in bias and accuracy factor values of 1.14 and 1.28, respectively, when observed and predicted μ_{max} -values were compared. Thus, on average μ_{max} -values for seafood and meat products were overestimated by 14%. Additionally, the reference growth rate parameter $\mu_{ref25^{\circ}C}$ was calibrated by fitting the model to 21 μ_{max} -values in vegetable products. This resulted in a $\mu_{ref25^{\circ}C}$ -value of 0.54 1/h. The calibrated vegetable model was successfully validated using 51 μ_{max} -values for psychrotolerant pseudomonads in vegetables. Average bias and accuracy factor values of 1.24 and 1.38 were obtained, respectively. Lag time models were developed by using relative lag times from literature data. Performance of the new expanded model was equally good for seafood and meat products, and importance of including the effect of acetic, benzoic, citric acids and CO₂ in order to accurately predict growth of psychrotolerant pseudomonads was clearly demonstrated e.g. for brined shrimps. The high number of environmental parameters included in the two models make them flexible and suitable for product development as the effect of substituting one combination of preservatives with another can be predicted.

Disclosure of Interest: None Declared

Keywords: Chilled food chain, Model validation, Product development, Shelf-life prediction, Spoilage