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Growth of *Pseudomonas* spp. in cottage cheese - a predictive microbiology approach

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Cottage cheese is a mixture of cheese curd with pH 4.5-4.8 and an uncultured or cultured cream dressing with a pH as high as 7.0. This results in a final product with microenvironments and a bulk pH of about 4.8 to 5.5. As for other lightly preserved foods microbial contamination and growth of spoilage microorganisms in cottage cheese can cause undesirable alterations in flavour, odour, appearance and texture. Contamination and growth of psychrotolerant pseudomonads including *Pseudomonas fragi* and *Pseudomonas putida* has been reported for cottage cheese but the influence of these bacteria on product spoilage and shelf-life remains poorly described. The present study used a quantitative microbial ecology approach to model and predict the effect of product characteristics and storage conditions on growth of psychrotolerant pseudomonads in cottage cheese.

The effect of temperature (5-15°C) and pH (4.9-7.0) on growth was quantified using automated absorbance measurements (Bioscreen C). A pronounced reduction of the maximum specific growth rate was observed at pH 4.9 but at pH 5.2 strains grew at 5°C, 10°C and 15°C. Challenge tests at 5-15°C with cottage cheese (pH 5.2-5.5), and cream dressing (pH 7.0) showed interesting results. Despite a lower pH value in the cottage cheese, compared to the dressing, more rapid growth was observed. This may be caused by insufficient amounts of oxygen in the cream dressing having a negative effect on growth of *Pseudomonas* spp. At 15°C growth of psychrotolerant pseudomonads ceased before the maximum population density of ca. 10^9 cfu/g was reached. This seems primarily caused by lactic acid bacteria and their acidification of the product to a pH of 4.8. Predictions from available growth models did not match the observed growth responses. Growth rates were systematically over-predicted by ComBase Predictor. A new, extended predictive model is under development to predict growth of psychrotolerant pseudomonads in cottage cheese.