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Developing a kinetic model for co-culture of yogurt starter bacteria growth in pH controlled batch fermentation

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Abstract

Streptococcus thermophilus and *Lactobacillus bulgaricus* are yogurt starter cultures widely used in the dairy industry. Co-culture of these bacteria leads to higher biomass yield than their separate single strain culture because of the proto-cooperation between the two species. In the present study, a kinetic model was developed for the growth and lactic acid production by these two bacteria in pH-controlled co-cultures. This model quantifies the effects of pH, temperature, lactic acid, carbon and nitrogen substrate concentrations, and the influence of each bacterium on the growth of the other. The latter effect was described by considering the calculated concentration of metabolites produced by each of the bacterium which stimulate the growth of the other. The model was validated by the experimental data obtained from a set of 12 experiments which were designed using the response surface methodology.

Key words: *Streptococcus thermophilus*; *Lactobacillus bulgaricus*; kinetic modeling; single strain culture; co-culture; proto-cooperation

Nomenclature: