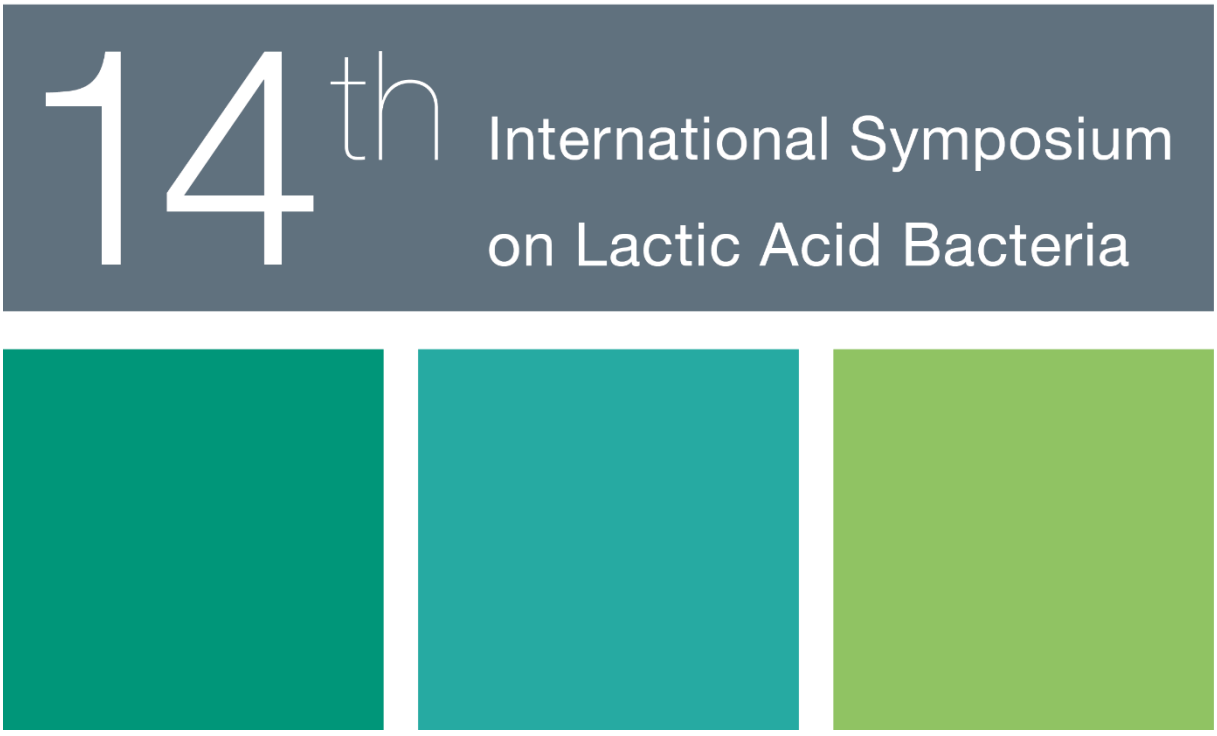
BOOK OF ABSTRACTS

14th Symposium on Lactic Acid Bacteria



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Growth inhibition of lactic acid bacteria during starter culture production

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Themes
Fermentation and Metabolism, including protein transition

Abstract
Lactic acid bacteria (LAB) are widely used as starter culture to make fermented dairy products, such as cheese and yoghurt. In these fermentations LAB produce lactic acid, thereby acidifying the food product and prolonging its shelf life. However, lactic acid production also poses a potential problem during the preparation of these starter cultures by inhibiting bacterial growth and thus decreasing biomass productivity, titer and yield. To provide an optimum pH for growth and alleviate inhibition by undissociated lactic acid, the pH is controlled at near-neutral pH values, where the dissociated lactate anion prevails. However, despite pH control, growth is inhibited as indicated by incomplete lactose utilisation in pH-controlled batch fermentations. Surprisingly, the underlying mechanism for this growth inhibition is still unclear. Inhibitory factors may include intracellular accumulation of the lactate anion, ionic and/or osmotic stress from lactate and counter-ions and/or another unidentified stress factor. In this study, we are quantitatively studying all the different potential inhibitory factors to decipher which factor mainly inhibits growth during pH-controlled batch fermentation of *Lactococcus lactis*. Applied methods include high-throughput growth rate measurements at varying lactate concentrations, pH values and osmolarities as well as pH-controlled batch fermentations and chemostat cultivations under specific compound limitations. Lactic acid concentrations and pH will be quantified intra- and extracellularly and linked to proteomes of selected samples. With this combined approach, we aim to get fundamental insights into microbial physiology during starter culture production and provide directions on how to improve biomass production and performance of starter cultures.

Keywords
Starter culture, Lactococcus, Physiology, Lactate, Osmotic, Transport