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Protein expression in *Lactococcus lactis* – an application in tagatose production

Title of the doctoral thesis	Expression of recombinant proteins in *Lactococcus lactis* – an application in D-tagatose production
Content of the doctoral thesis	Proteins are essential for life and are present in all cells, performing countless functions. By recombinant protein expression in a suitable host organism, it is possible to gain much higher yields of the desired protein more cost-effectively than by isolating them from natural sources. Recombinant proteins can be used, for example, as biological drugs, or in various enzymatic manufacturing processes. The same host, such as the often-used *Escherichia coli* bacterium, is not suitable to produce all proteins. *Lactococcus lactis* is a commercially attractive host for recombinant protein production with many potential applications, for example, in the food and pharmaceutical industries. Production of recombinant proteins requires a suitable expression system, and in this study, two new inducible recombinant protein expression systems for *L. lactis* were developed. One of them was used to produce arabinose isomerase from *Bifidobacterium longum*, and the enzyme was characterized. Tagatose is a rare sugar with health-promoting effects and can be used as a low-calorie sweetener. However, the production costs still limit its commercial use. This study investigated tagatose production using resting *L. lactis* cells harboring recombinant *B. longum* arabinose isomerase enzyme.
Field of the doctoral thesis	Biotechnology
Doctoral candidate and contact information	Licentiate of Technology Noora Salonen noora.j.salonen@aalto.fi
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Opponent	Professor Per Saris, University of Helsinki
Custos	Professor Alexander Frey, Aalto University School of Chemical Engineering
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Keywords	*Lactococcus lactis*, recombinant protein, tagatose, *Bifidobacterium longum*, arabinose isomerase