

Separation of Proteins on Ion-exchange Resins

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Lactoferrin (Lf) is a biologically active glycoprotein from the transferrin family, mainly found in milk. Lf exhibits antimicrobial, immunomodulating and anti-cancer activity. Lab-scale experiments were carried out to generate input data for simulations of an industrial plant for Lf production. Lf was purified using an ion exchange chromatography. Three ion exchange resins have been tested: Amberlite XAD761, Dowex 50WX4 and SP-Sepharose. Two different elution methods were employed: linear gradient and step gradient. The bicinchoninic acid protein assay method with BSA protein standard was used for further analysis of protein fractions. The composition of the different fractions was investigated by using SDS-PAGE electrophoresis to assess their purity. The conceptual project and economic analysis of a plant for production of LF were done using the software SuperPro Designer version 10.

Best results were obtained when SP-Sepharose was used as a stationary phase leading to a total recovery of Lf from column. The resin capacity determined using pure Lf was equal to 60 mg Lf/ml. The linear gradient resulted in the separation of lactoferrin into Lf a and Lf b, while in the step gradient, only one peak of lactoferrin was obtained. However, the most favorable was separation in step gradient, because in this method, higher concentrations of lactoferrin were obtained. Simulation results performed in SuperPro Designer indicate that the step method was more economical than the linear gradient method; therefore changing the Lf production method to step could reduce the cost of Lf production from milk whey.

Biography:

Aleksandra Zawodnia is a graduate student of the Poznan University of Life Sciences (Poland). In 2017 she earned M.Sc. degree in Biotechnology, on the Faculty of Agriculture and Bioengineering. At present, she works as a microbiologist at Poznan University of Life Sciences, Department of Biotechnology and Food Microbiology. She is interested in industrial biotechnology and environmental microbiology.