INDUSTRIAL TECHNOLOGY FOR PRODUCING RECOMBINANT LACTOFFERIN FROM THE MILK OF TRANSGENIC GOATS

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Abstract

Lactoferrin (LF) is the component of whey, resulting from coagulation of milk casein originating from humans and various animal species. This protein is regarded as a key element of primary protection of the organism. Apart from promoting systemic immunity, it exerts beneficial action on skin immune barrier and suppresses allergic response. The goal of this research was to design the efficient technology of recombinant human lactoferrin (rhLF) isolation from milk of transgenic goats and to adopt the isolation procedure at industrial facilities.

The targets of research were whole fresh and whole frozen milk of transgenic goats. The optimized technology of recovery of LF from whole milk is a process consisting of the following stages: defatting, production of whey, isolation of lactoferrin, concentration, desalination and freeze-drying of the end product. Research was carried out in the science laboratories of the Institute of Microbiology of the National Academy of Sciences of Belarus, Laboratory of the applied problems of biology of the Belarusian State University, Institute of Live Sciences of the North-Caucasus Federal University, and Belarusian State Technological University. Methods, used during investigation were: medium pressure liquid ion-exchange chromatography, SDS-PAAG electrophoresis, native PAAG electrophoresis, fat content determination by the Gerber method, membrane filtration method, centrifugation, and spectrophotometry.

As a result of conducted studies it was found that milk defatting at MF membranes is not inferior in efficiency to separation process, allowing to shorten consider the time of end product recovery. Protein profile of goat milk was represented by the following major types of proteins: immunoglobulins, lactoferrin, bovine serum albumin, α, β - caseins, β - lactoglobulin, and α - lactalbumin. Casein fraction accounted for the bulk of goat milk proteins (71.9 %), while whey proteins, including rhLF made up 14.2% of the total protein content. The average rhLF concentration equaled 3.06 g/L. According to densitometry analysis of gels stained with Coomassie R-250 the purity of LF preparation exceeded 90%.

The proposed scheme of LF recovery ensures high purity grade of the product and preservation of LF biological activity.

Key words: *Milk, Lactoferrin, Recombinant proteins, Transgenic goat, Ultrafiltration, Column chromatography, Electrophoresis, Purified proteins.*