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# THE CHALLENGES IN DEVELOPMENT OF PRODUCTS WITH PROBIOTICS

***Steva M. Lević*[1*], Nemanja S. Stanisavljević[2], Verica B. Đorđević[3], Jelena M. Begović[2], Ana S. Salević[1], Mirjana B. Pešić[1], Branko M. Bugarski[3], Viktor A. Nedović[1]***

*[1] University of Belgrade-Faculty of Agriculture, Belgrade, Serbia*
*[2] University of Belgrade- Institute of Molecular Genetics and Genetic Engineering, Belgrade, Serbia*
*[3] University of Belgrade-Faculty of Technology and Metallurgy, Belgrade, Serbia*
** Corresponding author: slevic@agrif.bg.ac.rs*

Lactic acid bacteria have been recognized as beneficial microbes for human health and wellbeing. However, poor survivability of probiotics, especially during storage and passage through the gastrointestinal system, limits their applications in food products. Hence, additional protection of probiotic cells is in many cases the necessity in order to maintain high cells number. The application of encapsulation techniques is a well-established approach for probiotic cells protection and their controlled delivery. Nevertheless, encapsulation procedures require optimization and test numerous carrier materials for establishing the best approach in regard to the properties of the final food product and preservation of cells during processing and storage.

In recent years, our research has been focused on the protection of probiotics using various encapsulation techniques such as freeze drying, spray drying, and cells entrapment into the gel matrix. Using these techniques and by combining carrier materials such as maltodextrin, inulin, alginate, and soy protein isolates it could be achieved up to 3.4 x$10^9$ CFU/g of encapsulate (in the dried form). The drying method and appropriate carrier material were found to be critical for cells viability. Spray drying inlet temperature should be up to 130°C, while maltodextrin showed more suitable properties as carrier material regarding cells protection and mechanical properties of encapsulates. Also, we are able to adjust encapsulates' size from several microns up to several millimeters, depending on final applications and targeted food product properties. Further, we optimized our research to produce encapsulates in sufficient quantities in order to test them in real food products. Although considered as the most suitable encapsulation procedure for preservation of probiotics high viability, our results indicate that after freeze drying the cell number was lower compared to spray drying, while the further processing of freeze dried encapsulates and incorporation into final products were more challenging.

*Keywords: Probiotics, Encapsulation, Spray draying.*

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