APPLICATION OF VIBRATING TECHNOLOGY FOR MICROENCAPSULATION OF BACTERIAL CELLS AND BACTERIOCINS

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Purpose. Microencapsulation is a promising technology useful for preserving bacterial cells and (bio)active compounds from surrounding conditions. Different main technologies have been described: coacervation, emulsification, spray drying, spray cooling and extrusion (De Vos et al. 2010, Int. Dairy J. 20:292-302). Recently, a mechanical procedure named vibrating technology was described. The aim of this study was microencapsulation of *Lactobacillus reuteri* DSM 17938 cells and nisin in Ca-alginate by vibrating technology.

Methods. A solution containing the product to be encapsulated and encapsulating polymer matrix, i.e. 2% alginate, is forced into a pulsation chamber and then extruded flowing through a nozzle. The droplets are undergone to an electrical field generated between the nozzle and the electrode in order to charge their surface. Electrostatic forces led to the droplets repulsion. Dropping of the beads in calcium chloride led to microcapsules formation by ionotropic gelation. Beads size depends mainly by nozzle diameter but also by superimposed vibration frequency, amplitude flow rate and physical properties of polymer-product solution.

Results. *Lactobacillus reuteri* DSM 17938 and nisin were encapsulated in Ca-alginate matrix. Light microscope immages show homogenous and spherical shaped capsules with a diameter of 150 μm. *L. reuteri* and nisin microcapsules were stained with Bac-light and Fluorescein isothiocyanate (fitc) respectively. Fluorescence microscope images display a high ratio of cell viability related to *L. reuteri* microcapsules and a high encapsulation efficiency for both microcapsules. Test *in vitro* shows that microencapsulation process preserve viability of *L. reuteri* cells and nisin bioactivity under different stress conditions.

Conclusions. Vibrating technology could be a valid technique for the production of different types of alginate-based microcapsules for application in biotechnological processes. This methodology has capability to produce small (<200 μm), mono-dispersed, homogenous and spherical capsules, with a narrow size distribution, using a short production time, under mild and simple conditions, low costs and high encapsulation efficiency (Whelehan and Marison 2011, J. Microencapsul. 28:669-688). Furthermore, this technique can be adapted to microencapsulation of several (bio)active compounds because of absence of high temperature application.