Public Abstract
First Name:Fei
Middle Name:
Last Name:Cheng
Adviser's First Name:Fu-hung
Adviser's Last Name:Hsieh
Co-Adviser's First Name:Azlin
Co-Adviser's Last Name:Mustapha
Graduation Term:SP 2015
Department:Food Science
Degree:MS
Title:Microencapsulation and Viability of A Probiotic in A Simulated Gastrointestinal Environment

The human-origin probiotic Lactobacillus rhamnosus strain GG (LGG) proved to exert health benefits in dogs. Like other strains, the viability of this probiotic is reduced while passing through the stomach and upper intestine because of the low pH and presence of bile. In this study, microcapsules loaded with LGG were prepared with the traditional extrusion method. Small drops of alginate (2.0 and 2.5% w/v), with and without xanthan gum (0.15% w/v) solution mixed with cell suspension and formed continuously by a syringe attached to a peristaltic pump, was added to 0.5M $CaCl_2$ solution and allowed to harden for 30 min, followed by coating with chitosan (1% w/v) for 30 min externally. The capsules of all formulations were able to improve the viability of LGG ($P<0.05$), maintaining it at a concentration of >107 CFU/g when separately exposed to simulated gastric fluid (SGF) for 2 h and simulated intestinal fluid (SIF) for 4 h. However, results of sequential incubation in SIF after SGF revealed a dramatic reduction in the viability of encapsulated cells with no difference from control, which cannot be explained with little information in the literature. No difference was detected in the bead appearance by environmental scanning electron microscopy, except that alginate beads incorporated with xanthan gum resulted in less severe wrinkles on the surface. All the formulations achieved encapsulation yields of around 80% and the cell viability remained at least 107 CFU/g after 4 weeks storage at refrigeration temperature ($P>0.05$). The overall situation indicated that the most stable microcapsules were chitosan-coated alginate (2.5% w/v)-xanthan gum (0.15% w/v) beads. These results indicated the potential of industrial application of chitosan-coated alginate-xanthan gum microcapsules.