

Abstrac

Proper nutrition and consumption of probiotic dairy products in preventing diseases such as high blood pressure, high cholesterol, weight gain, cardiovascular disease and cancer are important. The aim of this study was to investigate the possibility of producing instance probiotic yogurt powder using freeze-drying technique. Yogurt samples were prepared from fermented milk (1.5% fat) by starter cultures of *Streptococcus thermophilus* and *Lactobacillus bulgaricus* PTCC 1737. After fermentation, yogurt sample was dried by freeze dryer. The design variables included wheat dietary fiber (the presence or absence), the composition of capsules wall (in three levels of whey protein concentrate, pectin, pectin+whey protein concentrate) in three time period of (0, 15 and 30 days). Probiotic bacterium, *Bifidobacterium bifidum* PTCC 1644 was used in the encapsulation process after activation. Encapsulated bacteria samples were freeze dried and added to the dried yoghurt. The qualitative and quantitative properties of yogurt powder samples were evaluated for microbial analysis (cell counting of *Bifidobacterium bifidum* PTCC1644, investigation of survival rate of *Bifidobacterium bifidum* PTCC1644 in simulated stomach conditions), physicochemical properties (pH, acidity, morphology of encapsulated bacteria and yogurt powder, solubility index of yogurt powder, syneresis value of immediate yogurt and rheological test) and sensory properties (color, odor and taste) at 0, 15 and 30 days intervals. Statistical analysis was performed based on a factorial experiment in a completely randomized design and comparison of means at 95 percent was conducted using SAS version 9.1. The results showed that the Whey Protein Concentrate + pectin gum coating, could be the best combination for microencapsulation and maintained the viability of *Bifidobacterium bifidum* PTCC1644 to the 3.55 log CFU/g after 30 days of storage at -4 °C. In all yogurt powders stored at 4 °C, reducing the number of bacteria *Bifidobacterium bifidum* PTCC1644 was observed in time period of 0, 15 and 30 days, but it was much lower than the control sample (yogurt powder containing free bacteria). Also, the application of whey protein concentrate + pectin gum, for *Bifidobacterium bifidum* PTCC1644 provided the highest survival in simulated gastric conditions compared to other coatings. The presence of wheat dietary fiber in coatings used in the microencapsulation hadn't a positive impact on the viability of *Bifidobacterium bifidum* PTCC1644 ($P > 0.05$).

Keywords: Yogurt, Freeze dryer, *Bifidobacterium bifidum* 1644, Microencapsulation.



University of Zabol

Graduate school

Faculty of Agriculture

Department of Food Science and Technology

**The Thesis Submitted for the Degree of M.Sc (in the field of
Food Science and Technology)**

Preparation of instant probiotic yogurt powder

Supervisors:

Dr. M. A. Najafi

Advisor:

M.Sc N. Soltani tehrani

By:

S. Seyfzadeh

September 2016