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398

Microencapsulation of *Lactobacillus paracasei* LAFTI® L26 by extrusion in an alginate matrix

Sousa, Sérgio C. (1); Gomes, Ana M. (1); Pintado, Maria M. (1); Malcata, F. Xavier (1); Rodrigues, Dina (2); Rocha-Santos, Teresa (2); Silva, José P. (3); Lobo, José M. Sousa (3); Costa, Paulo (3); Amaral, Maria H. (3); Bahia, Maria F. (3); Freitas, Ana C

1: Escola Superior de Biotecnologia, Universidade Católica Portuguesa, Rua Dr. António Bernardino de Almeida, 4200-072 Porto, Portugal;
2: ISEIT/ Viseu, Instituto Piaget, Estrada do Alto do Gaio, Galifonge, 3515-776 Lordosa, Viseu, Portugal;
3: Faculdade de Farmácia, Universidade do Porto, Rua Aníbal Cunha, 164, 4050-123 Porto, Portugal

E-mail: sdcruz@mail.esb.ucp.pt

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Abstract

Probiotic bacteria are currently used in the development of functional food products, yet sometimes face technological challenges when incorporated in food matrices with more aggressive environments – salt, acid or oxygen concentrations. Encapsulation is an efficient technique to overcome such difficulties since encapsulation microcapsules help in their protection from both the product intrinsic properties and the gastrointestinal tract. Among the many factors influencing encapsulation efficiency, capsule size is an important issue since it can affect the textural and sensorial properties of the food product to which they are added. In this research work the microencapsulation efficiency and stability throughout storage of calcium alginate capsules (produced by extrusion) of *Lactobacillus paracasei* LAFTI® L26 was studied. Initially, extrusion by coaxial flow was used for encapsulation. Storage in Ringer solution at 4 ºC in a 1:9 (g/mL) racio – and the effect of a protecting agent – lactose, were assessed (samples collected at 0, 3, 5, 7 and 14d). In order to reduce the capsules' size, extrusion by aerodynamically assisted flow was also tested and two different rupture solutions (sodium citrate 2 %(w/v) and phosphate buffer (0.5 M; pH 7)) were assessed. The capsules obtained via extrusion by coaxial flow presented dimensions superior to 200 µm. The incorporation method was shown to be effective. Suspension of the *L. paracasei* LAFTI® L26 alginate capsules in Ringer solution and storage at 4 ºC was shown to be a good preservation method and lactose did not present a protective effect. Such encapsulation increased survival of bacteria under storage at 4 ºC for two months (samples collected at 0, 3, 5, 7, 14, 21, 30 and 60d), reducing the decline of viable cell numbers when in comparison with free cells (3 log cycles versus 4 log cycles). The size of the capsules obtained using extrusion by aerodynamically assisted flow was smaller than 100 µm which allows the capsules to be incorporated in food products without a negative sensorial perception. The encapsulation method was also shown to be effective and no difference between rupture solutions was observed.