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(P3.04) Chia oil microencapsulation as a technological alternative to increase its oxidative stability

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Chia seed oil (CSO) is the major vegetable source of alpha-linolenic acid. Microencapsulation technologies protect these fatty acids against oxidative degradation, allow the handling of products rich in oils as solid materials and facilitate its incorporation in certain foods such as bakery products. Among them, spray drying is the most widely used due to its low cost, flexibility and scalability. The aim of this work was to analyze different alternatives of gas-droplet contact for the spray drying of chia oil-in-water emulsions. The former configuration corresponded to a laboratory scale tall type spray dryer, while the latter corresponded to a pilot scale short type spray dryer. Coarse emulsions were prepared by high speed homogenization of CSO and a mixture of soy protein isolate (SPI) and gum arabic (GA) as encapsulants; 1/1 SPI/GA and 2/1 [(SPI+GA)/CSO] ratios were used. The coarse emulsions were further homogenized in a high-pressure valve homogenizer. The pH of fine emulsions was adjusted to 3.0 to induce complex coacervation, and the reaction was completed with stirring at 40 °C and 30 min. Finally, maltodextrin DE 5 as carrier agent was incorporated before spray drying to achieve a 22% w/v final total solid content. The co-current contact gave microcapsules with greater oxidative stability (3 times higher than bulk oil), which was associated to less thermal degradation. Meanwhile, the mixed flow configuration yielded products with poor oxidative stability. It can be concluded that a co-current spray dryer configuration constitutes a better alternative for the protection of heat-sensitive ingredients.

Key words: Chia oil, Laboratory scale, Pilot plant scale, Microencapsulation, Spray drying