

Effect of cryo-treatment and carriers on spray-dried kefir powder and its reconstitution properties

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Objective:

The present work aimed at evaluating the effect of cryo-treatment and carriers, trehalose and fructooligosaccharides (FOS), at varying concentrations, on the physicochemical characteristics of spray-dried kefir powder and its reconstitution properties.

Methods:

Homogenized and pasteurized semi-skimmed bovine milk and commercial starter cultures were used for kefir production. Heat-treated (90°C for 5 min) milk, was cooled at 30°C and inoculated with the starter cultures consisting of lactic acid bacteria (XPL-30, CHR HANSEN, Denmark) and yeasts (LAF-4, CHR HANSEN, Denmark). Following fermentation (30°C until pH 4.4), a probiotic culture (BB-12, CHR HANSEN, Denmark) was added to the product and eight different samples of spray dried kefir were prepared. Apart from the control, for comparison purposes, the effect of three different concentrations (0.5-2.5% w/v) of trehalose and FOS, added in kefir prior to drying, was evaluated alongside the effect of cryo-treatment, -12°C for 24 h followed by 24 h at 4°C, before drying. Spray-drying on an SD-8 Mini Spray Dryer (Israel) was performed at reduced process temperatures.

Kefir and reconstituted samples were analysed for their physicochemical (pH, moisture, color, bulk and tapped density, flowability, cohesiveness, water solubility index and insoluble matter), rheological (apparent viscosity, flow behavior index and elastic and viscous moduli) and microbiological (lactic acid bacteria, yeast and probiotic viability) properties. Particle size distribution via laser diffraction and morphology by confocal laser microscopy were also assessed on the dry kefir powder and its reconstituted samples.

Results:

According to the results, cryo-treatment and trehalose proved to favour the functional and reconstitution properties of kefir powders whereas FOS addition also affected them, but to a lesser extent.

Conclusions:

Cryo-treatment of kefir and the addition of carriers (trehalose and FOS) can improve kefir microflora survival and the reconstituted product properties.

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