

PHYSICOCHEMICAL PROPERTIES OF ICE CREAM MIXES

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Abstract

The purpose of the work was to study the functional and technological properties of natural ingredients in low-calorie ice cream as potential structure stabilizers and fat substitutes. Ice cream mixes with β -glucans from oats and yeast, with fermented and non-fermented pectin-containing beet purée were studied. The viscosity of the mixes was measured on an ultrasonic viscometer Unipan type 505, viscoelastic properties on a Kinexus lab+ device, surface tension on a KSV Sigma 700 tensiometer, water activity on an AWMD-10 device.

According to the results of the research, it was established that oat β -glucan shows greater technological activity in the composition of ice cream mixes with a low fat content (2%), compared to β -glucan from yeast, including the combination with soluble pectin of vegetable purée. Fermented beet purée, which contains at least 1.0% soluble pectin, has the greatest impact on the structural and mechanical characteristics of low-fat ice cream mixes in all its combinations with other structuring ingredients. Ice cream mixes with oat β -glucan and vegetable purée at lower frequencies of measurement of viscoelastic properties show high elasticity, but after exceeding a certain frequency value, the structure is destroyed and the mixes show greater viscosity than elasticity, which will allow more intense saturation of the mixes with air under freezing. A correlation between viscosity, water activity and surface tension of low-fat ice cream mixes was revealed, which is explained by intermolecular interaction between macromolecules of hydrocolloids and active binding of free water by a complex of low- and high-molecular compounds. An alternative substitute for the Vianoks C45 stabilization system (mono- and diglycerides of fatty acids + polysaccharides) in the amount of 0.5% in low-fat ice cream is a complex of natural ingredients - oat β -glucan and fermented beetroot purée in amounts of 0.5 and 15%, respectively.

β -glucan from oat and fermented vegetable puree reveal synergism between β -glucan macromolecules and vegetable pectin to form complex three-dimensional structures in low-fat ice cream mixes that significantly improve the viscoelastic characteristics, surface tension, and water activity of the obtained ice cream mixes.

Keywords: *ice cream, viscosity, rheology, β -glucan, pectin, purée*