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Effect of salep as a hydrocolloid on storage stability of 'İncir Uyutması' dessert

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Abstract

Salep is a natural stabilizing agent used widely in Turkish-type Maraş ice cream and some milk desserts. The effect of salep addition on the storage stability of a representative İncir Uyutması dessert, prepared from whole cows' milk, fig and sugar was studied. Dry matter, pH, viscosity, water-holding capacity (WHC), color properties (L^*, a^*, b^* values), mineral matters (Al, Ca, Cu, Fe, K, Mg, Na, P and Zn), sensorial properties and microbial quality of desserts were affected by salep addition, sugar and fig concentrations. Salep addition caused an important increase in the viscosity and the WHC of dessert. Salep, sugar and fig improved the storage stability of the dessert.

Keywords: Salep; Hydrocolloid; İncir Uyutması; Storage stability; Viscosity; WHC

1. Introduction

Semi-solid dairy desserts including different aroma substances have widespread consumption in Europe. They are consumed by many consumer groups like children and adults due to their nutritiveness and sensational characteristics, and essentially include milk, thinner (as hydrocolloids), sugar, aroma substances (like vanilla and banana) and colorants. The differences between the characteristics of these additives (like fat value of milk, type and concentration of starch, type and concentration of hydrocolloids, aromas and coloring agents) and their relations with each other cause important differences in physical and chemical characteristics of the products. These differences affect their acceptability by to the consumers (Bukhtoyarova, Demina, & Osadchuk, 1996; Ohba & Iio, 2000; Tarrega & Costell, 2005).

İncir Uyutması is a dairy dessert manufactured by the Turks in Anatolia and Middle Asia. In traditional manufacture of İncir Uyutması, figs are broken into pieces and milk is boiled in a separate vessel. Broken figs are mashed together with some boiled milk and sugar is added according to taste in the middle of mashing. Mixing continues until a homogeneous body is obtained. The rest of the milk is added at the end of the mixing operation. The mixture is put aside for 30 min at approximately 40 °C and then kept in a refrigerator. After approximately 4–5 h of refrigeration, İncir Uyutması is ready to serve.

Importantly, both the viscosity and syneresis of desserts are markedly influenced by milk composition, additives, processing treatments and the addition of hydrocolloids. Hydrocolloids are hydrophilic polymers, of vegetable, animal, microbial or synthetic origin, that generally contain many hydroxyl groups and may be polyelectrolytes. They are naturally present or added to control the functional properties of aqueous foodstuffs. Hydrocolloids have a neutral taste and aroma, which permit a free flavor release of all ingredients. Natural hydrocolloid gums can serve as good sources of soluble dietary fiber (about 85% on a dry basis). The soluble fiber has been reported to lower serum cholesterol and improve gastrointestinal function and glucose tolerance (Renard, 1996; Rollet, 1995).

Salep is produced from tubers of orchids that grow naturally in various regions of Turkey. It constitutes the raw material of a traditional Turkish beverage and is used

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for giving hardness and elasticity to Kahramanmaras-type of ice cream. Salep is also used as a raw material for some drugs. Salep is a drog (flour) obtained from underground lumps of many species of the Orchidaceae family (like *Salep orchida*). In addition, it is a common name given to orchid species in Anatolia. The principal substances contained in salep vary according to the time of harvesting, but consist of mucilage, starch, sugar, protein and minerals. The color is generally creamy. The most important substance in salep is glucomannan, which gives it an important stabilizer capacity, since it swells when used with water and milk. It is commonly used as a stabilizer in ice cream production. Salep especially gives the special structure, taste and odor to the Maraş ice cream in Turkey. There is a demand for salep from an orchid species growing only in the hills of Kahramanmaraş, Turkey, in the world.

The objective of this study was to determine the effects of salep addition, fig and sugar concentrations on the physical, chemical, sensory and microbiological properties of İncir Uyutması dessert during storage.

2. Materials and methods

2.1. Materials

The milk used in İncir Uyutması manufacture was provided from stockbreeding pilot management in the Animal Science Department of the Agriculture Faculty of Selçuk University. The milk contained 9.5% non-fat dry matter, 3.6% fat, 3.6% protein, pH 6.9, SH acidity 7.2 and density 1.030. Natural salep (9% water, 2% ash, 3.5% invert sugar, 12% starch) and fig (100 g of the used figs has 4 g protein, 55.3 g sugar, 1.2 g fat, 6.7 g fiber, 138 mg Ca, 4.2 mg Fe, 91.5 mg Mg, 163 mg P, 217 kcal energy, 0.073 mg B1 and 0.072 mg B2 vitamins) were obtained from Kahramanmaraş city and from Tariş Co., respectively.

2.2. İncir Uyutması manufacture

The formula and manufacture process for İncir Uyutması are given in Table 1 and Fig. 1, respectively.

In İncir Uyutması manufacture, raw milk was first filtered and heated for 10 min at 90 °C. Figs were removed from their stems after being kept for 5 min at 100 °C. They were broken into small pieces. Then, fig pieces, salep and sugar were added into the heated milk and mixed for 5 min with a mixer. After obtaining a homogeneous body, the mixture was transferred into cups. İncir Uyutması in the cups was held for 30 min at 40 °C. Then the product was refrigerated for 12 h at about 5 °C.

2.3. Analysis methods

Dry matter was determined according to the standard methods of AOAC (1995). pH was determined according to Bradley et al. (1992) with a pH meter (pH 340i/SET 206 WTW, Weilheim, Germany).

Table 1
The substances used in the formulations of İncir Uyutması desserts and their amounts

Ingredients (%)			
Sample no.	Salep	Sugar	Fig
1	–	5	5
2	–	5	10
3	–	5	15
4	–	10	5
5	–	10	10
6	–	10	15
7	0.7	5	5
8	0.7	5	10
9	0.7	5	15
10	0.7	10	5
11	0.7	10	10
12	0.7	10	15

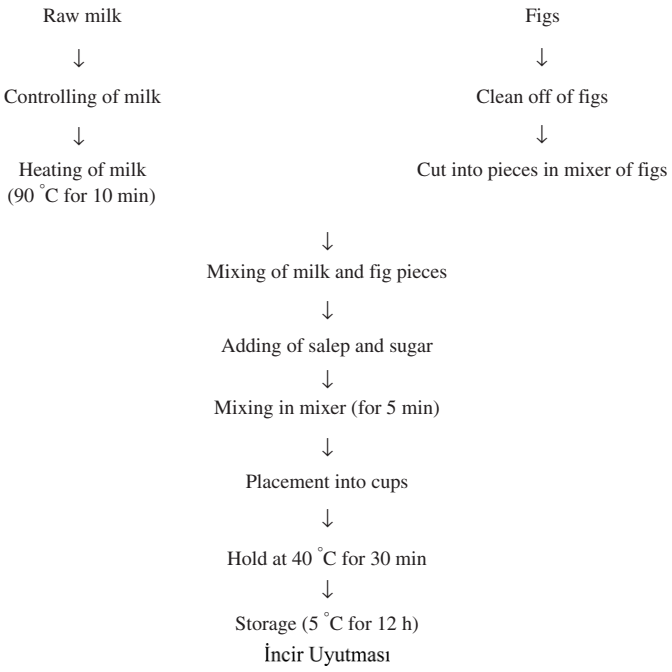

Fig. 1. Flow diagram of manufacture of İncir Uyutması dessert.

2.3.1. Viscosity

Viscosity was determined according to Ogaro, Pilasof, and Bartholomai (1986). Samples were analyzed for viscosity using a Brookfield DVII Viscometer (Brookfield Engineering Laboratories, Manual M97-114-D1000, personal communication) at 100 rpm using number a 7 spindle. Measurements were taken after 1 min of rotation and results were recorded as centipoises (cP).

2.3.2. Water-holding capacity (WHC)

The WHC was determined by a procedure adapted from Li and Guo (2006); 20 g of İncir Uyutması desserts (Y) were centrifuged for 10 min at 1250g at 4 °C. The whey