

Chutarat Kowittaya 2006: Factors Affecting Quality of Reduced Fat Vanilla Ice Cream Using Inulin as Fat Replacer. Master of Science (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Assistant Professor Somjit Surapat, Ph.D. 98 pages.
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Reduction of fat content in ice cream lowered its sensory quality and acceptance. This problem should be overcome. The object of this study was to use inulin as an ingredient to improve the quality of reduced fat ice cream and to study factors affecting its quality. Control ice cream mix (9% fat w/w) was produced by heating liquid ingredients (whipping cream and water) to 50 °C before incorporating sugar, skim milk powder and stabilizer. The mix was pasteurized at 80 °C for 2 min, then chilled and aged at 4°C for 24 hr. The ice cream mix was frozen and hardened at -25 °C. Reduced fat ice cream (3% fat w/w) was produced and 0, 3, 6 and 9 % (w/w) inulin was added to replace fat. The results showed that concentrations and degree of polymerization (DP) of inulin significantly affected physical and sensory qualities of the reduced fat ice cream. Short chain inulin (GR, DP< 10) increased the viscosity of the ice cream mix resulting in less overrun and increased hardness ($p<0.05$) with increasing concentration. At 9% (w/w) inulin (GR), the meltdown of ice cream was slower than the control mix; whereas, 3% (w/w) and 6% (w/w) concentration caused faster meltdown. When inulin concentrations were the same at 6% (w/w) long chain inulin (HP, DP> 23) gave higher viscosity, harder, lower overrun and meltdown than short chain inulin (GR) ($p<0.05$). With mixed inulin, long and short chain (inulin) at 1:1 ratio (total 6% w/w) the improvement of the physical properties along with the sensory attributes and acceptance of the reduced fat ice cream was not significantly different from the control. When inulin was used to improve the quality of reduced fat ice cream, the proper amount of stabilizer should be added. Adding of stabilizer (PALSGAARD® 5924) at 0.25, 0.5 and 0.6% (w/w) increased ice cream mix viscosity, decreased overrun and increased hardness of the reduced fat ice cream ($p<0.05$). Meltdown of reduced fat ice cream was slower with high amount of stabilizer; However, adding 0.5% (w/w) stabilizer resulted in sensory attributes and consumer acceptance that were not significantly different from the control formula ($p\geq 0.05$). Moreover, partial substitution of sugar with high (40.3), medium (38.1) and low (29.7) DE glucose syrup caused increasing viscosity, decreasing overrun and hardness as well as faster meltdown comparing with ice cream mix containing sugar. Glucose syrup can improve ice cream properties; smoothness, firmness, mouth coating and viscosity. Moreover, when using medium (38.1) DE glucose syrup, it yielded the most acceptance ice cream and increased resistance to heat shock phenomena.

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