

**OXIDATION AND TEXTURAL CHARACTERISTICS OF BUTTER AND ICE CREAM
WITH MODIFIED FATTY ACID PROFILES**

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ABSTRACT

Chemical and physical properties of butter and ice cream with a modified fatty acid composition were determined. The main objective of the research was to determine if a modification of the fatty acid profile caused changes in the oxidative stability, texture or sensory perception of the modified dairy products.

A successful modification of the fatty acid profile of milk was achieved by addition of safflower oil and high oleic safflower oil to the diets of Holstein cows. High-oleic (22.45%) and high-linoleic (5.99 %) milkfat were obtained and processed into butter and ice cream for comparison with a control milkfat (18.22% C18:1 w9; 2.81% C18:2 w6). A higher amount of unsaturated fatty acids ($P < 0.05$) was obtained for the high linoleic and the high oleic treatment when compared to the control (37.85%, 35.90% and 30.72% respectively). The high-linoleic treatment increased CLA content from 0.6 to 1 % of total fatty acids.

The increase of unsaturated fatty acids in the milkfat led to variations in oxidative stability of high-linoleic ice cream samples after 3 to 5 months of storage. Peroxide values increased significantly ($P < 0.05$) for the high-linoleic ice cream when compared to the high-oleic and control ice cream (22.04, 2.83 and 2.54 meq of peroxide/kg respectively). Peroxide values for high-linoleic ice cream decreased after 7-9 months of storage to levels comparable to the other treatments (7.51-8.68 meq/kg).

Texture properties also were affected by the fatty acid modification. The control butter showed higher firmness values when statistically contrasted with the unsaturated treatments ($P = 0.0086$). Firmness values were lower for the high-oleic and high-linoleic treatments when compared to the control (6.09 J, 6.95 J and 10.54 J respectively). Viscosity of ice cream mixes

was measured and a similar response to variations in shear rate was obtained for the three treatments, even though the control ice cream mix values were higher ($P < 0.05$).

Two sensory analyses were conducted to determine differences in flavor (oxidation flavor) and texture (scooping test). No significant differences were found in the scooping test or the oxidized flavor difference test.

This research proved that the addition of vegetable oils in the diet of cows increased the concentration of unsaturated fatty acids and decreased saturated fatty acids in the milkfat. An increase of long chain polyunsaturated fatty acids (C18:2 w6 to C22:6 w3) was related to changes in oxidative stability of ice cream after extended storage. A decrease in firmness values and a decrease in intensity of yellow color in the unsaturated butters were also evident.

Some chemical and physical properties were changed for the high-oleic and high-linoleic ice cream and butter but most important is the improved and more desirable fatty acid profile obtained with the additions of the oils to the diet of the cows.

Key words: Ice cream, butter, oleic acid, linoleic acid, conjugated linoleic acid (CLA), firmness, oxidation rate, peroxides