Formulation and laboratory-scale production of low-fat and low-trans fatty acid spreads -
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Background and Objective: Spreads are products with the property of spreadability on bread, usually containing 40-80% fat. The morbidity and mortality of cardiovascular diseases, which have a strong association with the type and amount of fats consumed, are on the increase. The objective of this study was to formulate and produce at the laboratory scale low-fat (40%) and low-trans fatty acid (<5%) spreads by blending, using two types of stabilizers, sodium alginate and modified waxy maize starch (MWMS). Materials and Methods: The characteristics of the oils to be used (peroxide value=PV, iodine value= IV, and slip melting point-mp ) and suitable amounts of stabilizers (1% sodium alginate and 3% MWMS) were first determined. Then six samples of low-fat (40%) spreads were formulated (2 Kg ) by combining three oil phases and two stabilizers as follows: F1 and F2 formulas with palm stearin and canola oils (40:60), the stabilizers being sodium alginate (F1) and MWMS (F2) F3 and F4 with fully hydrogenated soybean oil (flakes) and soybean oil (25:75), the stabilizers being sodium alginate (F3) and MWMS (F4) F5 and F6 with palm, cottonseed and canola oils (40:40:20), the stabilizers being sodium alginate (F5) and MWMS (F6). A high-fat spread (F7, 80% fat) containing palm stearin and canola oils (40:60), with no stabilizer, served as control. The physical and chemical characteristics of the samples, including fat and moisture contents, PV, IV, mp, fatty acid composition, solid fat content (SFC), and consistency, were determined. Results: The trans-fatty acid content of the oil phases in the formulas and their nutritional value (P/S+T) were <1 % and ≥1 respectively which is considered desirable. The solid fat contents (SFC) of F1 and F2 at 0, 10, 20, 30 and 35 °C were similar to the respective control (F7) values, with desirable spreadability (p<0.05). Penetration of the low-fat spreads was higher than that of control. Ranking of the samples, performed on the basis of the nutritional value and the physical and chemical characteristics, gave the following results: F7>F2 & F1>F5& F6>F4 & F3. Conclusion: Considering the cost of oil hydrogenation and the effects of the amounts and types of fat on health of the individuals and communities, and on the basis of the results of this research, F1 and F2 are recommended to be used as spreads, for further research in larger scale.

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