

NON-HYDROGENATED PALM-BASED PASTRY SHORTENING

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Commercial pastry shortenings are usually produced from hydrogenated fats. Partial hydrogenation produces *trans* fatty acid which may cause the LDL (bad cholesterol) to increase. In order to overcome this problem, palm-based pastry shortening formulations without hydrogenation have been developed.

OBJECTIVES

- Reformulate a commercial *trans* fatty acid containing pastry shortening with non-hydrogenated palm-based formulation.
- Evaluate the physical properties of the shortening.
- Evaluate the baking performance.

METHODOLOGY

The technology refers to the formulation of a pastry shortening and the requisite method for puff pastry production. In the development of the product, raw materials such as palm oil products, colouring agents and others were obtained locally.

Processing was carried out in a perfector pilot plant (Gerstenberg and Agger, Copenhagen, Denmark) at the Malaysian Palm Oil Board (MPOB). The consistency of the samples were analysed at 15°C, 25°C, 35°C and 40°C for 30 days, to study their stability at various conditions. A baking test, which reflects product performance, was conducted in the MPOB Bakery Laboratory and a popular commercial pastry shortening was used as the reference.

RESULTS

The sample has an excellent solid fat content (SFC) profile (Figure 1). The SFC of the commercial samples F254 and F255 reduced gradually from 85%-25%, at 5°C-35°C, then reduced less gradually from 17%-5% at 35°C-45°C. This indicated that the fat had a good plasticity for the laminating process in puff pastry products.

The commercial samples F254 and F255 contained 7.9%- 34.4% *trans* fatty acid (Table 1), indicating that hydrogenated oils were present in the formulation. Reformulation of the commercial

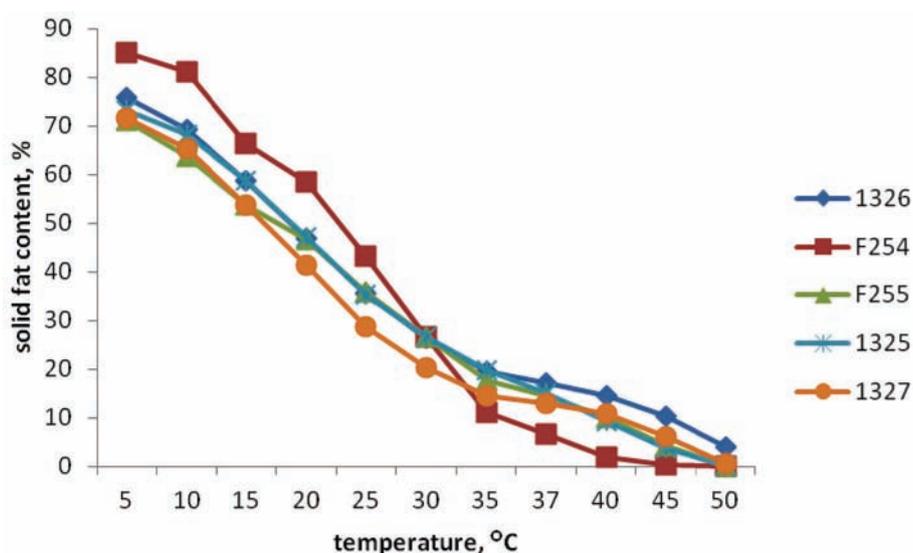


Figure 1. Solid fat content of commercial (F254, F255) and experimental (1325, 1326 and 1327) pastry shortenings.



TABLE 1. FATTY ACID COMPOSITION OF COMMERCIAL SHORTENING SAMPLES

Code	Percentage											Total <i>trans</i>
	C12:0	C14:0	C16:0	C16:1	C18:0	C18:1t	C18:1	C18:1i	C18:2	C18:3	C20:0	
F254	-	0.1	12.4	-	13.8	34.4	25.8	10.6	2.2	0.2	0.5	34.4
F255	0.2	0.9	36.3	0.1	11.1	7.9	28.8	1.7	11.3	1.2	0.4	7.9
1326	3.4	2.2	49.3	0.1	4.2	-	31.7	-	7.8	0.2	0.4	-

product was carried out. Non-hydrogenated fats from palm-based materials were selected based on the SFC. The *trans*-free formulations (1325, 1326 and 1327), were tested in MPOB Margarine Pilot Plant (Figure 2) and the products performed like the commercial sample. The texture of the product was smooth and homogenous, with good plasticity and was very similar to the commercial reference sample. Baking performance of puff pastry showed that sample 1326 had the best formulation (Figure 3).

ECONOMIC EVALUATION

The indicative fees for the formulation and royalty in 2013, subject to change, are given below:

Technology value = RM10 000.

Royalty = 5% gross production

Viability parameters @RM 3.20 kg⁻¹ shortening

Payback period = 1 year

Benefit: Cost (B:C) ratio = 1: 1.03

Internal Rate of Return (IRR) = 15%

Net Present Value (NPV) = RM 1 270 751

Return on Investment (ROI) = 32.72

Viability parameters @ RM 3.80 kg⁻¹ shortening

Payback period = 1 year

B:C ratio = 1: 1.22

IRR = 93%

NPV = RM 25 808 759

ROI = 144.99

POTENTIAL MARKET AND COMMERCIALISATION

Current life-style has changed our diet and preference for food. Fast-food restaurant industry is growing rapidly and pastry product is one of the favoured foods by the younger generation in its outlets. This could reflect to the growing demand of pastry shortening. Thus, existing margarine manufacturers could add pastry margarine line to their existing products to cater the current and future demands.



Figure 2. Non-hydrogenated palm-based pastry shortening produced in the MPOB Margarine Pilot Plant.



Figure 3. Performance test on formulated samples 1325, 1326 and 1327 in comparison the control sample.

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