

# PALM-BASED SHORTENING FORMULATIONS FOR TURKEY

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**T**urkey consumes about 1.5 million tonnes of oils and fats annually. This consumption is met by 700 000 t of indigenous oils and fats production and 800 000 t of imports. Turkey, being one of the major importers of palm products in West Asia, offers good market growth potential for palm oil and palm kernel oil products. The growth opportunities are apparent in both the edible and non-edible sectors. In the edible sector, growth lies in the production of low or *trans*-free shortenings, margarines and commercial frying oils. In 1999, Turkey imported 258 000 t of palm products which constituted 33% of the total imports of oils and fats.

Shortening is typically a 100% fat product, consisting of mixtures of triglycerides formulated with animal and/or vegetable oils or their combinations thereof (Chawla *et al.*, 1990). In recent years, the demand for functionally superior, cost effective fats that can be used effectively in applications requiring thermal stability (for deep frying) and plasticity (for baking) has increased. Plasticity of a fat may be defined as the ability to retain its shape under slight pressure, but yielding under increased pressure such as that encountered during rolling, mixing and spreading

(Mcwilliams, 1979). Shortenings should be of good plasticity in order to lubricate the ingredients in dough preparation and to facilitate the incorporation of air, which will lead to a desirable cake volume. In addition, shortenings also give structure, improve palatability and extend the shelf-life of the baked products.

*Trans*-fatty acids formed during hydrogenation have been found to have an adverse effect on human health. *Trans*-fatty acids can deleteriously affect plasma lipoproteins by increasing plasma total cholesterol, low density lipoprotein cholesterol (LDL-C) and by decreasing the beneficial HDL-cholesterol. Due to this, there is an increasing need to replace hydrogenated fats with natural solid fats in many food formulations. Palm oil and palm products can meet this need since they are free from *trans*-fatty acids. We have developed several *trans*-fatty acid free shortening formulations suitable for the Turkish market.

## CHARACTERISTICS OF THE SHORTENINGS

The formulations were coded as 430, 431, 432, 433 and 434. The appearance of all the samples was acceptable. Sample 431 was shinier than the others. Sample 431 also happened to be the softest followed by samples 430 and 432. All these shortenings had solid fat content profiles that were relatively flat.

## CONSUMER TESTS USING TURKISH PANELLISTS

Bakery products, namely, cake (*kek*), cookies (*kurabiye*), *baklava* (Figure 1) and *borek*, were produced at a commercial bakery in Gebze, Turkey using the formulated shortenings. To test the acceptability of the products made with the formulated shortenings, they were subjected to hedonic scoring tests using consumer panellists. The consumer tests were conducted over four consecutive days, one day for each product. All sensory score sheets were written in Turkish and there were a minimum of 100 consumer panellists in each session. The results of the consumer tests showed that all the bakery products made with the palm-based shortenings were well accepted by the Turkish panellists.

TABLE 1. APPEARANCE AND CONSISTENCY OF THE SHORTENINGS

Sample	Appearance	Consistency
430	Normal, shiny	Soft (good for cake and cookies).
431	Shiny	Very soft, good for <i>baklava</i> .
432	Less shiny	Soft (good for cake and cookies, suitable for <i>borek</i> ).
433	Normal	Slightly firm (good for <i>borek</i> , still okay for cake and cookies).
434	Normal	Soft to slightly firm (good for <i>borek</i> ).

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Figure 1. Baklava, a Turkish dessert.

Formulations 431, 432 and 433 are recommended for cakes; 430, 432 and 433 are recommended for cookies; 431 and 432 for baklava while 433 and 434 are good for borek.

### PRODUCTION ECONOMICS

The start-up investment cost of shortening production is estimated at RM 993 500 with 42% (RM 415 000) attributable to plant and machinery acquisition and another 44% or RM 440 000 on building, construction and land purchase. The rest of the capital cost estimates cover civil works and other capital establishments. Under full operation at a production level of 300 t yr<sup>-1</sup> and at a long term price of RM 2000 t<sup>-1</sup>, shortening commercial production is expected to generate a pre-tax income of RM 120 645 (Table 2). The unit cost of production is estimated at about RM 1598 t<sup>-1</sup>. Using a 10% discount factor, a benefit cost analysis of shortening production indicates that the investment prospective is moderately attractive with a payback period of six years. The commercial venture is expected to yield a B:C of 1.108, NVP of RM 453 725 and IRR of 12%. As the B:C is greater than unity, NVP is positive and IRR is greater than the opportunity cost of capital: thus the investment is financially viable.

TABLE 2. GROSS MARGIN ESTIMATION

<b>Production Cost</b>		345 000
Raw materials	234 000	
Packaging	15 000	
Labour	96 000	
<b>Processing Cost</b>		60 175
Utilities	5 000	
Depreciation	49 675	
Maintenance	2 500	
Fuel	3 000	
<b>Administration</b>		59 180
EPF	15 180	
Wages	42 000	
Insurance	2 000	
<b>Marketing</b>		15 000
<b>Total</b>	479 355	
<b>Sales</b>	600 000	
<b>Gross revenue</b>	120 645	
<b>Unit Cost of Production</b>		
Fixed cost	165.5833	
Variable cost	1432.267	
Total cost	1597.85	

### REFERENCES

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