

PALM-BASED FLUID SHORTENING (MPOB SHORTENING FL30)

by: MISKANDAR MAT SAHRI; YAAKOB CHE MAN; NOR AINI IDRIS;
RUSSLY A RAHMAN and MOHD SURIA AFFANDI YUSOFF

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MPOB has produced FL30, a shortening formulated from palm oil, which is fluid and provides the functions required for a good baking fat (Figure 1).

Bakery products were improved significantly when emulsified shortening was introduced in 1933 (Hui, 1996). Pure vegetable shortenings were accepted as premium products both by housewives and the commercial bakers due to their uniform white colour and smooth texture that improves stability, creaming properties and bland taste.

The advance in technology, especially in the food service and processing sectors, has created the need for new shortenings, and liquid, chips, fluid and powdered shortenings have joined the current plasticized products (Miskandar *et al.*, 2004). Fluid shortening is a suspension of hard fats, emulsifiers and additives or combinations in liquid oils, formulated to be of pourable or pumpable consistency at room temperature and stable over the temperature range 15.6°C-32.2°C (O'Brien, 2004). Fluid and liquid shortenings are both pourable, but the liquids are clear while the fluids opaque from suspended solids (Weiss, 1983; O'Brien, 2004). The fluid nature

of the product provides better control of the formulation volumetrically and for pouring. Similar to plasticized shortenings, it can be formulated to contain emulsifiers for the end product performance.

PRODUCT NOVELTY

Conventional shortenings, which are in plastic form, need to be scooped or cut and weighed prior to use. Being flowable and pumpable at room temperature (25°C-30°C), FL30 provides the functional properties of a solid shortening for baking and frying.

PRODUCT CHARACTERISTICS

The solid fat contents (SFC), one of the measurements of product functionality, of two products (FL30 and a solid shortening) were significantly different at temperatures higher than 20°C, indicating the difference between them at these temperatures. FL30 had a SFC lower than 15% at 20°C, suggesting that it will be fluid or liquid in nature (Miskandar *et al.*, 1998; 2004) (Figure 2).

The stirring speed has a significant effect on FL30 in batch production (Miskandar *et al.*, 2004). However,



Figure 1. Production of fluid shortening.

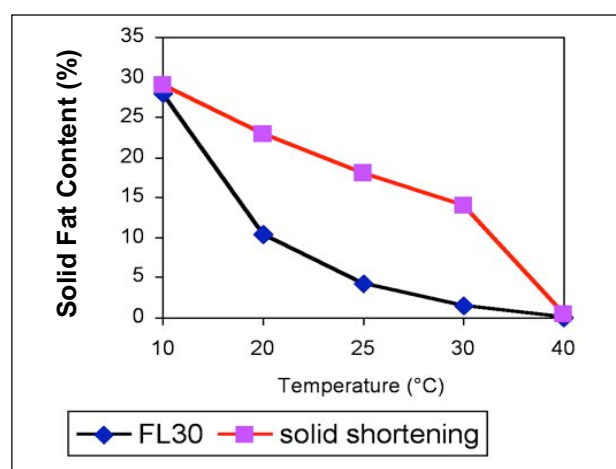


Figure 2. The solid fat content of palm-based fluid shortening (FL30) and solid shortening.

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Malaysian Palm Oil Board, Ministry of Plantation Industries and Commodities, Malaysia
P. O. Box 10620, 50720 Kuala Lumpur, Malaysia. Tel: 03-89259155, 89259775, Website: <http://mpob.gov.my> Telefax: 03-89259446



its storage at 25°C for three weeks determined that its hard-based fat content formulation is the main determinant of its physical properties, although the stirring speed and emulsifier content also had influence (Table 1). The crystal aggregates, in addition to the polymorphic crystal type, and their distribution in bulk, are important factors contributing to the flowability of the fluid shortening as shown in Figure 3.

INVESTMENT OPPORTUNITIES

The capital investment for production of FL30 is approximately RM 4.1 million, of which RM 1.7 million is for the crystallizer system and packaging. At the net present value (NPV) of RM 583 719 and an investment rate of return (IRR) of 30%, the payback period is four years.

TABLE 1. OPTIMUM POINTS OF RESPONSE FACTORS DURING STORAGE AT 25°C FOR ONE AND THREE WEEKS

| Response factor | Acceptable range | Optimum points | |
|-------------------------|------------------|----------------|--------|
| | | Week 1 | Week 3 |
| SFC, % | 1-5 | 3.31 | 2.56 |
| Viscosity, cP | 200-1 800 | 1 744 | 1 604 |
| Diameter, μm | 3-5 | 5 | 4 |
| Pourability, s/100 ml | 2-13 | 3 | 3 |

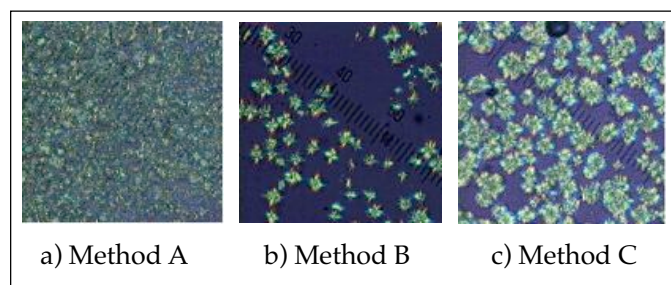


Figure 3. Photomicrograph showing the crystal distribution in FL30 by different processing methods. Crystals of homogeneous size and distribution by method C indicates good fluidity and stability.



Characteristics of MPOB shortening FL30

Appearance: between clear liquid to consistent plastic fat.

Crystal: homogenous crystal clusters of $\sim 40 \mu\text{m}$ suspended in liquid fats.

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For more information kindly contact:

Director-General
MPOB

P. O. Box 10620

50720 Kuala Lumpur, Malaysia.

Tel: 03-89259155, 89259775

Website: <http://mpob.gov.my>

Telefax: 03-89259446