

A VARIETY OF BAKERY PRODUCTS CAN BE MADE WITH PALM OIL BASED SHORTENINGS

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DECEMBER 1992



PORIM INFORMATION SERIES

ISSN 0128-5726

FFrom breakfast to a midnight snack, from starter to dessert, and from a Sunday brunch to festive delicacies, there are a host of opportunities for you to serve baked items right through the day and right through the year.

Bakery products include breads, rolls, cakes, biscuits/cookies, puddings and various types of pastries. Some examples of food items which are made from pastries are pies, tarts, croissants, Danish and puff pastries. One could have toast, croissants or rolls for breakfast; sweet rolls, sandwiches or pastries for snacks; cakes, pudding or pies for desserts, fruit cake, cookies or Danish pastries for afternoon tea, special

cake decorated with icings or toppings and variety of cookies for special or festive occasions.

All the above baked items use flour and fat as their basic ingredients. Fats are of various types and shortening is one of them. Although there are two main types of shortenings, *i.e.* plastic and pumpable (fluid), the former is more commonly used. Plastic shortening is semi-solid (consistent form) and smooth in texture. Shortening is widely used in the preparation of many foods, particularly in the manufacture of bakery products.

In formulating shortenings, oils and fats may be derived from vegetable, animal or marine sources. Some of the possible ingredients for shortening are shown in *Table 1*. The ingredients can be divided into three categories. A successful blend can be made by combining one or more ingredient(s) from each group.

FUNCTIONS OF SHORTENINGS IN BAKERY PRODUCTS

Shortening contributes to tenderness of various baked products. In breads, the ba-



Figure 1. Cookies Made with Palm Oil Shortening

TABLE 1. OILS AND FATS FOR SHORTENINGS

Liquid Oils	Semi Solid Fat	Hard Stock
Palm olein	Palm oil	Hard fraction from palm oil
Palm kernel olein	Butter oil	Hard fraction from butter oil
Sunflower		
Soya bean	Marine oil, hydrogenated	
Low erucic acid rapeseed	Lard	Hard fraction from beef fat
Cottonseed		
Corn	Any vegetable oil hydrogenated to 32-34°C	
Ground nut		Any hydrogenated oil or fat of melting point 40°C upwards

Ingredients are flour, liquid and yeast. Fat, sugar and salt are added to improve texture and flavour. An appropriate amount of fat or shortening in bread dough will improve the volume, grain, texture, crust and keeping quality of the bread. Shortening improves the tenderness of bread and makes the dough more elastic.

One important function of a shortening is to incorporate and hold air, whether beaten in a cake batter or creamed with sugar. This ability to hold air is generally increased by the plastic consistency of the shortening. Air bubbles are suspended in the liquid fat and are stabilized by fat crystals. For optimum creaming ability and to be functional in cakes, the shortening must be stable in the beta prime form. Beta prime form refers to tiny fat crystals about 0.2 to 1 μ in size. The tiny crystals are responsible for the smooth texture of the shortening and aid in incorporation of numerous air bubbles

during creaming process. In this respect palm oil shortening is of advantage because the crystals exist in the beta prime form.

As an ingredient in cake manufacture, shortening:

- 1) provides aeration to the batter;
- 2) acts as lubricant for ingredients;
- 3) provides structure to the finished products;
- 4) improves overall eating quality such as moistness and tenderness;
- 5) extends shelf life of the finished product; and
- 6) from nutrition standpoint, it contributes calories.

In the manufacture of biscuits (as known in the United Kingdom and Malaysia) or cookies (as known in the USA), the principal ingredients are flour, sugar and fat in order of usage volume. There is a spectrum of recipes from those with low fat and high water to those with high fat and low water, both in the presence of flour and sugar (Manley, 1983). Their low moisture content differentiate biscuits/cookies and crackers from other baked cereal products such as breads and cakes. Although fats are the third largest component after flour and sugar, they are probably the most important ingredient used in biscuit manufacture since they are relatively more expensive. Addition of fat or shortening to biscuit or cookie dough contributes to lubricating function and gives the dough its required consistency.

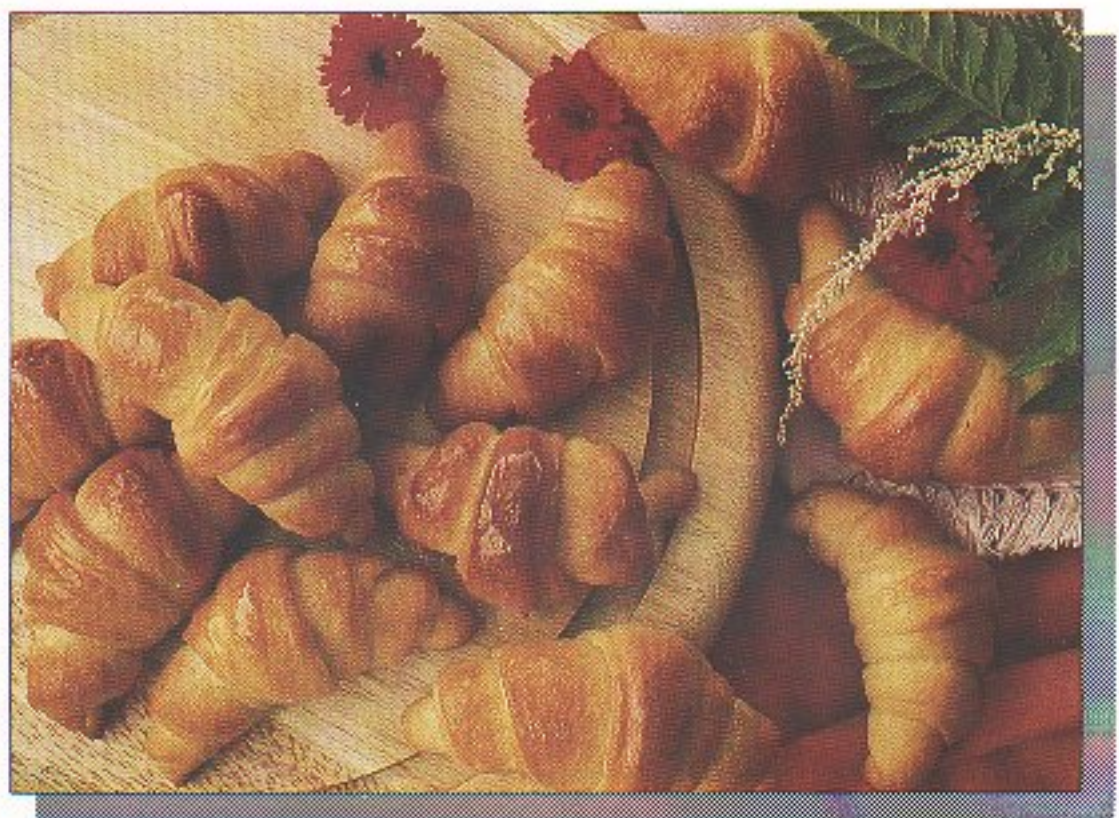


Figure 2. Crescent Rolls Made with Palm Oil Shortening

Fat retards gluten network development, that is, dough will be less cohesive/sticky, less elastic/rubbery and less tough. Little or no gluten network is formed if the percentage of fat is greater than 20% (Wade, 1988). Very soft dough is obtained because there is minimal formation of gluten network and starch swelling and gelatinisation is reduced. The dough is 'short' that is, not extensible, hence the term 'shortening' has been coined as an alternative to 'fat'

Similarly in pastry, fat shortens the strands of gluten and prevents their development, thus producing tenderness. In croissants, Danish or puff pastries, fat not only provides tenderness, excellent keeping quality and richness, but also makes possible the formation of layers which account for the flaky characteristic. The types of fats which can be used in these products are shortening, margarine or sweet butter. Cost is usually the controlling factor. A blend of shortening and butter is often used.

ADVANTAGES OF USING PALM OIL IN SHORTENING FORMULATIONS

1) At 20°C, it has 22-25% solids and is a valuable ingredient for shortening formulation.

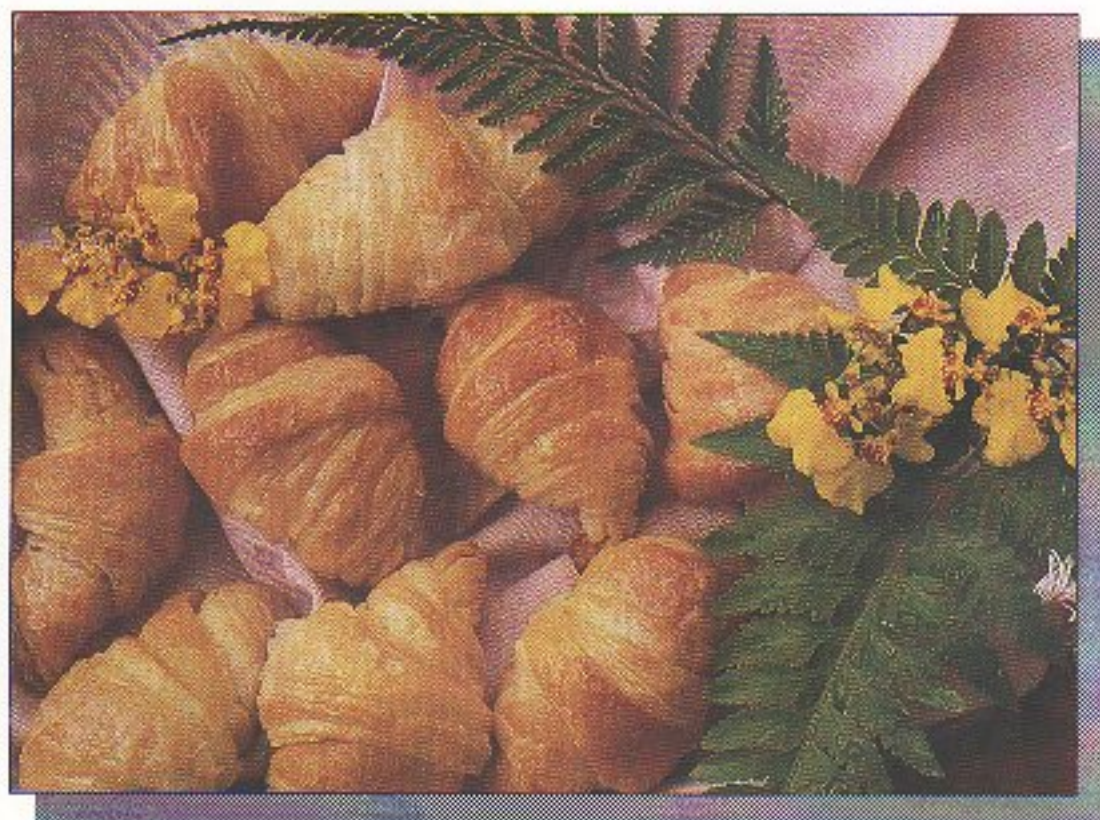


Figure 3. Croissants Made with Shortening Based on Palm Oil And Palm Stearin

- 2) It stabilizes the shortening in beta prime form, which is required for good performance.
- 3) It does not require hydrogenation, thus reducing processing cost as well as eliminating the formation of 'trans fatty acid' 'Trans fatty acid' has become a nutritional concern due to its reported negative effects (Mensink and Katan, 1990)
- 4) It is very versatile and can be tailor-made to suit a particular application.
- 5) It is very stable and has a long shelf life due to the presence of vitamin E which acts as a powerful natural anti-oxidant.

APPLICATIONS OF PALM OIL BASED SHORTENINGS IN BAKERY PRODUCTS

Shortening based on 100% palm oil is suitable to be used in making of biscuits/cookies, breads and rolls (Figures 1 and 2). The use of palm oil products can be maximized by employing modification processes such as fractionation, blending, interesterification or hydrogenation. The fractionation process of palm oil yields the liquid fraction, palm olein, and the solid fraction, palm stearin, which is considered a by-product. Palm olein is mainly used as a frying oil. Palm stearin, being a cheaper product, is very economical for shortening

formulation and it helps improve plasticity of the shortenings. By adding a certain percentage of palm stearin to palm oil, bread with improved volume and texture can be obtained. Such a shortening has also been found to be very good for different types of pastries as well as croissants (Figure 3).

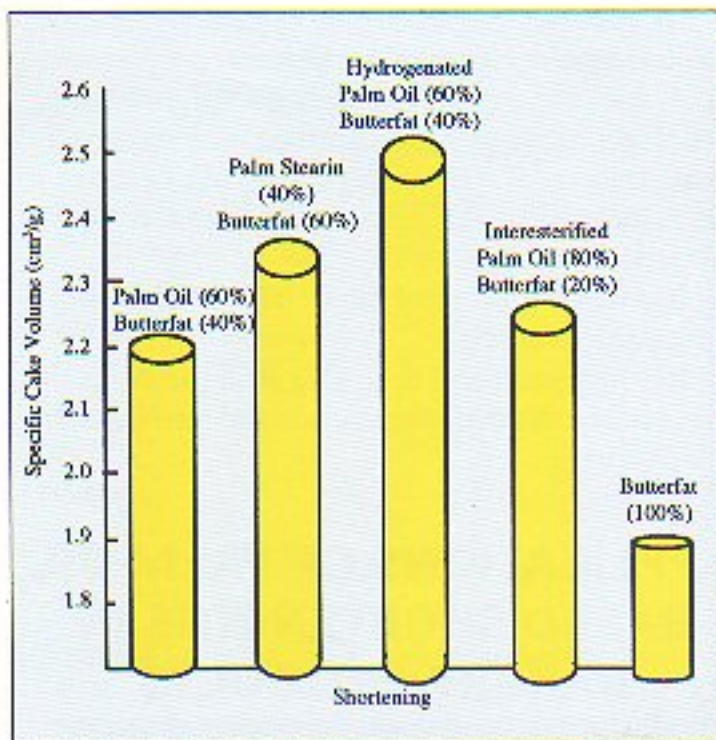


Figure 4. Specific Volume of Cakes Made with Palm-butterfat Shortenings

In order to get baked product with buttery flavour, palm oil and its derivatives can be blended with butterfat (milkfat). In cakes, shortenings based on this combination have shown better performance in terms of volume compared to 100% butterfat (Figure 4). Thus, users get both benefits of flavour and improved functionality by blending butterfat with palm oil or its derivatives. Furthermore, this product is considered as a value-added product and can be sold at a higher price than 100% palm oil shortening. However, its price is still lower than 100% butterfat. Thus it has an economic advantage. Shortenings based on palm oil and butterfat are also very suitable for making biscuits/cookies. A sensory panel gave a high score to biscuits made with palm oil-butter fat blends (Figure 5). Alternatively, diacetyl, a flavouring ingredient, can be added to 100% palm oil shortening to give the buttery flavour to biscuits.

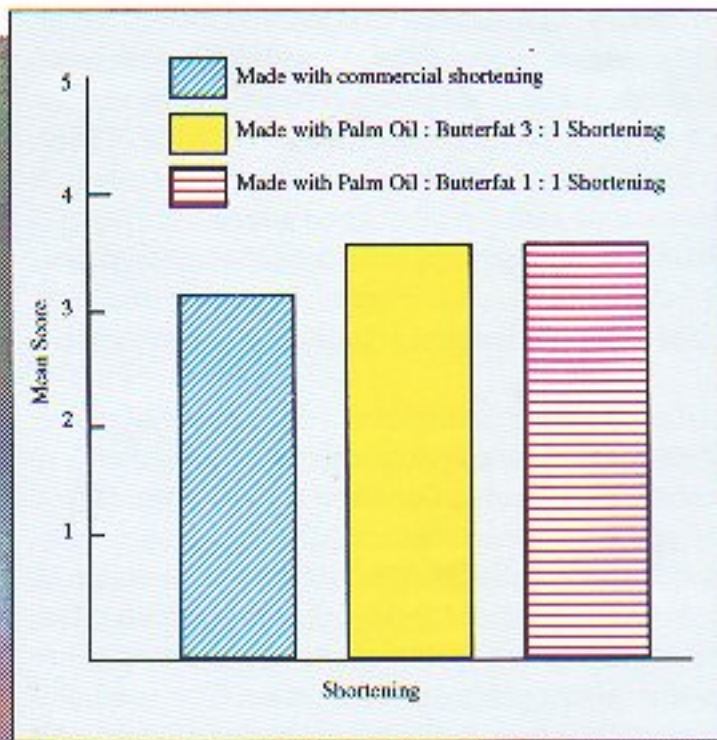


Figure 5. Mean* Panel Score of Biscuits for Flavour Made with Different Shortenings Using Hedonic Scoring Method

* n = 15, score is from 1 to 5 where 1 = dislike very much and 5 = like very much

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