

PALM-BASED TRANS-FREE PUFF PASTRY MARGARINE

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Puff pastry is one of the most remarkable products from the bakeshop. It has the ability to rise to eight times its original thickness when baked to form a flaky structure. The rise is due to the unique and intricate lamination of alternate layers of pastry dough and roll-in fat. Puff pastry dough recipes are usually without leavening agent and puffing of the dough is very much dependent on the performance of the laminating fat. Laminating fat is used to prepare a wide variety of products such as Danish pastry, croissants, turnovers (chaussons), fruit tarts, strudels, pinwheels, pretzels and palmiers.

Laminating fats can either be shortenings or margarine, usually produced from blends of hydrogenated oils and fats. Hydrogenated fats are preferred functionally as they exhibit fast crystallization which is advantageous in obtaining a firm and plastic texture during processing. To the margarine manufacturer, the fast crystallization rate allows higher production rate of puff pastry margarine. However, the current challenge faced by the puff pastry margarine manufacturer is the restriction on the use of hydrogenated fats because they contain *trans*-fatty acids which are implicated in vascular diseases. The global trend is towards *trans*-free formulations. The labelling of *trans*-fatty acids in foods has become mandatory in many countries, e.g. US from 1 January 2006. Palm oil has a natural solid content free of *trans*-fatty acids, and therefore, great potential as a substitute for hydrogenated fats.

THE PALM-BASED BLENDS FOR PUFF PASTRY MARGARINE

Replacement of hydrogenated fats in puff pastry margarine with selected palm-based fractions is possible with an understanding of the functions of the former. In such margarines, the solid fat content (SFC) should be 40% to 50% at 20°C to 25°C - typically the temperature in which the lamination process is done. The SFC also has to be <15% at

37°C to 40°C to avoid a waxy or greasy after-taste in the final baked product.

A palm-based *trans*-free fat blend was formulated based on three basic requirements. Firstly, high melting point fats were used as the backbone to confer firmness to the product during lamination. An example is palm stearin with high melting triglycerides (TAG) to withstand the extensive stretching of the dough during sheeting, a crucial attribute of roll-in fats (Figure 1). Secondly, medium melting fractions with fast crystallization were introduced to facilitate formation of a firm and plastic structure in the resting tube immediately after the blend leaves the super chilling process. Finally, liquid oils were used to lower the high SFC



Figure 1. Palm-based high melting fractions.

profile contributed by the high and medium melting triglycerides, and to achieve the desired SFC profile. Liquid oils are trapped within the crystal network during the superchilling process. The processing of the blend was carried in the perfect pilot plant as shown in Figure 2.

MPOB PPM 1 was formulated based on the three requirements discussed above (Figure 3). The composite oils and fats used were carefully selected palm-based fractions combined with soyabean oil to obtain the required SFC. The formulation was natural and free of *trans*-fatty acids. The formulation also cost less - without the expense of the

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hydrogenation that would otherwise have been required. The selection was based on the SFC profiles and crystallization rates of the individual fats as well as those of the blends. MPOB PPM 1 matched the solid fat profile of the commercial samples from the USA and Europe as shown in Figure 4. The product also had a good 'plastercine-like' texture (flexibility of the product) as seen in Figure 5 by the smooth penetration and broad band release in the adhesiveness.



Figure 2. Perfeqtor pilot plant with the resting tube.



Figure 3. Palm-based trans-fatty acid-free puff pastry margarine.

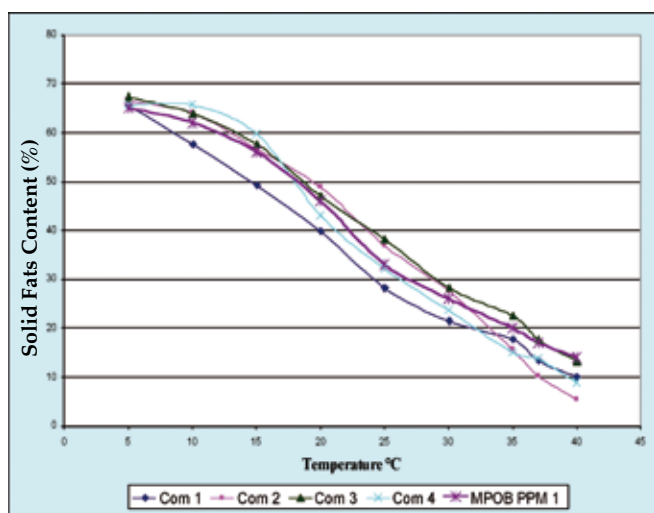


Figure 4. Solid fat content profiles of MPOB PPM1 puff pastry margarine and similar commercial products from US and Europe.

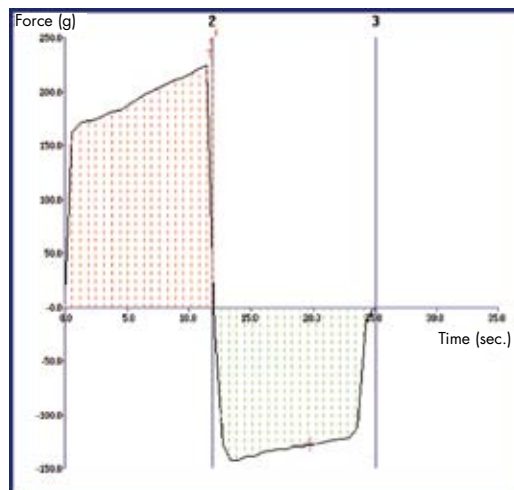


Figure 5. Texture analysis of MPOB PPM 1 showing smooth penetration and broad release indicating flexibility of the product.

CHARACTERISTICS OF PALM-BASED PUFF PASTRY MARGARINE

- The product is firm and plastic at the working temperature and easily managed during lamination;
- The margarine is able to form a thin, even continuous layer during lamination;
- The product does not leave a waxy or greasy after-taste;
- A healthier replacement for hydrogenated fats, free from *trans*-fatty acids; and
- The product is also cholesterol-free.

CONCLUSION

Palm-based fractions are able to replace hydrogenated fats in puff pastry margarine but careful selection of the oils and fats is required. A formulation with the proper balance of palm-based high melting fractions, medium melting fractions and liquid oils was able to substitute for hydrogenated fats in the processing of puff pastry margarine.

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