

Reducing *Trans* and Saturated Fatty Acids in Roll-in Fats Using Palm Oil Fractions

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Partially hydrogenated fats that contain significant amounts of *trans* fatty acids (TFA) are slowly being phased out in edible fat products. The reformulation work has been a challenge to the food industry, especially in formulations which require high levels of solids. These fats, such as roll-in fats, have solid fat content ranging from 40% to 45% at 20°C. Roll-in fats require a 'plastic-elastic' quality to facilitate the extensive dough lamination process. The plastic texture is very much related to the level of solids present in the fat formulation. At the same time nutritionists and food technologists are concerned over direct replacement of TFA fats with saturated fatty acids.

This purpose of this study was to reduce the saturated fatty acid levels while replacing TFA in roll-in fats levels. To do this, the approach taken in a series of preliminary studies was to evaluate the liquid oil retention ability of high melting point stearin. The stearin used was of IV 14 with the main triglyceride compound was 56% of tripalmitoglycerol (total C16:0 fatty acid was above 70%). The melting point of this stearin was 60°C. The formulation consisted of 10% stearin IV 14, 45% of palm fraction, of melting point below 35°C, and 45% of sunflower oil. This fat blend was processed through a perfecter pilot plant. The plant configuration applied was three units of super chilling scrape surface heat exchangers positioned in series. The processing conditions were able to facilitate the formation of firm margarine blocks. The blocks were tempered at 20°C.

The block of roll-in fat produced did not soften nor display oil out problems. Texture analysis was carried out to determine the plastic-elastic performance of the fat. The results from this analysis had a release reading of 1556 gs, with smooth penetration, a broad band and single stage release pattern. The pattern denoted flexibility of the roll-in margarine. The flexibility is crucial in ensuring the performance of the roll-in fats to form even layered and continuous film of fat. The ability to form a consistent film of fat will ensure even puffing up of the pastry during baking. The percentage of saturated fatty acids in this formulation was 38%, monounsaturated was 32% percent and the polyunsaturated was 30%. The *trans* fatty acids were reduced to below 0.5% in this formulation. In comparison, the level of saturated fatty acids and *trans* fatty acids detected in commercial roll-in fats were in the range of 46% to 50% and 4% to 6% respectively.

The study shows that, contrary to conventional wisdom, palm oil fractions can be used to replace partially hydrogenated fats to reduce both *trans* and saturated fatty acids levels in fat formulations, which require high levels of solids in the end use.