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MILKFAT - VEGETABLE OIL BLENDS FOR THE MANUFACTURE
OF DANISH PASTRY MARGARINE

A thesis presented for the degree of
Master of Technology
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ERRATA

pg. 32... line 7. Should read "... with 0.2% of Pricat 9900 catalyst (w/w on a nickel basis)."

pg. 32... lines 21 and 24 should read "... Pricat 9908 catalyst (w/w on a nickel basis)..."

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SUMMARY

In an attempt to increase the utilization of milkfat in the baking industry, the present study was undertaken to manufacture a margarine containing a large proportion of milkfat which would be suitable for the production of danish pastries.

Initially, a sample of commercial pastry margarine used for manufacture of danish pastries in Japan was purchased. The fatty acid and triacylglycerol compositions were determined by gas liquid chromatography while the melting characteristics were studied using nuclear magnetic resonance spectroscopy and differential scanning calorimetry. The analysis showed that the Japanese pastry margarine contained a sufficient proportion of solid fat in the region at which the pastry was rolled (15-20°C) and enough solid fat was retained at the proofing temperatures. In addition, this pastry margarine melted totally at body temperatures.

A series of blends was formulated with melting characteristics similar to that of the Japanese pastry margarine. These blends contained a large proportion of milkfat (60-70%), an oil with a final melting point below 5°C and a fat with a large proportion of high melting triacylglycerols. These latter fats were prepared by hydrogenating cottonseed and palm oil in a pilot scale hydrogenation vessel made at the New Zealand Dairy Research Institute.

A blend containing hydrogenated palm oil :milkfat :sunflower seed oil (20 : 70 : 10) was manufactured into margarine by four different methods. Two processes involved churning cream in a z-blade reworker, the other two involved rapid cooling of the product mix in a scraped surface heat exchanger. From these manufacturing trials, two experimental margarines were selected for use in the danish pastry baking trials. These margarines gave satisfactory danish pastries although they had less flakiness and volume increase than the pastries made from the Japanese pastry margarine. This was probably due to the worksoftening of the experimental margarine which caused the dough layers to stick together and bring about a loss in the flakiness and volume of the pastries.

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NOMENCLATURE

For lipids containing glycerol, the nomenclature suggested by the IUPAC - IUB Commission on Biochemical Nomenclature (Biochem. J. 1967) is used.

Fatty acids are designated by number of carbon atoms : number of double bonds, e.g. 16:0 refers to palmitic or 1-hexadecanoic acid.

Triacylglycerols are designated by the number of acyl carbon atoms, e.g. C₃₈ or 38.

A number of abbreviations have been used:

FA	Fatty acid
FFA	Free fatty acid
HMF	High melting fraction
IMF	Intermediate melting fraction
LMF	Low melting fraction
rpm	revolutions per minute
TG	Triacylglycerol

All pressures stated in the text are in absolute pressures.