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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  
in Food Technology  
at Massey University

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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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## TABLE OF CONTENTS

	<u>page</u>
CHAPTER 1	
INTRODUCTION ... ..	1
1.1 Production of margarine ... ..	1
1.1.1 Oil processing . ... ..	1
1.1.2 Modification processes of oil . ... ..	4
1.1.3 Manufacture of margarine . ... ..	6
1.1.4 Analytical techniques ... ..	8
1.1.5 Types of margarine .. ... ..	9
1.2 Production of butter .. ... ..	11
1.2.1 Manufacture of butter ... ..	11
1.2.2 Modification processes of milkfat .. ... ..	13
1.3 Baking of danish pastries .. ... ..	14
1.4 Aim of present work ... ..	16
CHAPTER 2	
MATERIALS AND METHODS . ... ..	17
2.1 Chemicals and solvents ... ..	17
2.2 Materials ... ..	17
2.3 Chemical analysis ... ..	18
2.3.1 Determination of salt, moisture and curd	18
2.3.2 Determination of peroxide value ... ..	18
2.3.3 Determination of alkalinity ... ..	19
2.3.4 Determination of iodine value . ... ..	19
2.3.5 Determination of refractive index .. ... ..	19
2.3.6 Determination of fatty acid ... ..	19
2.3.7 Determination of triacylglycerol ... ..	25
2.3.8 Determination of <u>trans</u> -isomer . ... ..	25
2.4 Physical analysis ... ..	27

	<u>page</u>
2.4.1 Determination of softening point ... ..	27
2.4.2 Determination of thermal properties ...	27
2.4.3 Determination of solid fat content . ...	28
2.4.4 Determination of hardness ... ..	29
2.5 Hydrogenation of vegetable oils . ... ..	30
2.6 Filtration of hydrogenated oils . ... ..	33
2.7 Deodorization of hydrogenated oils ... ..	33
2.8 Formulation of fat blends .. ... ..	36
2.9 Production of margarine and butter ... ..	36
2.10 Baking of danish pastries .. ... ..	41
2.10.1 Physical measurements ... ..	46
2.10.2 Sensory evaluation .. ... ..	46

### CHAPTER 3

RESULTS AND ANALYSIS .. ... ..	48
3.1 Analysis of a danish pastry margarine ...	48
3.2 Analysis of milkfat ... ..	51
3.3 Hydrogenation of vegetable oils . ... ..	55
3.3.1 Variation in iodine value, refractive index and softening point . ... ..	55
3.3.2 Variation in fatty acid composition and solid fat content ... ..	56
3.3.3 The effect of different catalyst ... ..	62
3.4 Formulation of fat blends .. ... ..	67
3.4.1 Component fats and oils of the blends ...	67
3.4.2 Blends containing hydrogenated cottonseed oil .. ... ..	68
3.4.3 Blends containing hydrogenated palm oil .	68
3.5 Production of margarine and butter ... ..	79
3.5.1 Preparation of the blend . ... ..	79
3.5.2 Manufacture of margarine . ... ..	82

	<u>page</u>
3.5.3 Manufacture of butter ... ..	82
3.5.4 Comparison of margarine and butter . ...	84
3.6 Baking of danish pastries .. ...	84
3.6.1 Physical evaluation . ... ..	86
3.6.2 Sensory evaluation .. ... ..	92
 CHAPTER 4	
DISCUSSION .. ... ..	95
4.1 Factors affecting melting behaviour and rheo- logical properties of margarine and butter	95
4.1.1 Triacylglycerol composition ... ..	95
4.1.2 Polymorphism ... ..	95
4.1.3 Solid miscibility ... ..	96
4.1.4 Manufacturing conditions . ... ..	97
4.1.5 Emulsifiers ... ..	98
4.2 Formulation of fat blends .. ... ..	99
4.3 Rheological properties of margarine and butter . ... ..	100
4.3.1 Experimental margarine made by different methods ... ..	100
4.3.2 Butter made by different methods ... ..	101
4.3.3 Comparison of margarine with butter made by similar methods .. ... ..	101
4.3.4 Comparison of experimental margarine with the Japanese pastry margarine . ... ..	101
4.4 Baking of danish pastries .. ... ..	103
4.5 Future investigations . ... ..	104
 APPENDIX ... ..	 105
 BIBLIOGRAPHY ... ..	 121

LIST OF TABLES

<u>No.</u>		<u>page</u>
1	Results of response factors ... ..	23
2	Retention times of positional and geometrical isomers of fatty acids ... ..	25
3	Results of standards for the determination of <u>trans</u> -isomers ... ..	27
4	Analysis of Japanese pastry margarine ... ..	49
5	Analysis of milkfat ... ..	52
6	Hydrogenation of cottonseed oil with an active catalyst (method A) ... ..	57
7	Hydrogenation of cottonseed oil with a very selective catalyst (method B) ... ..	64
8	Hydrogenation of palm oil with a very selective catalyst (method C) ... ..	64
9	Solid fat contents and softening points of blends containing hydrogenated cottonseed oil and Japanese pastry margarine .. ...	69
10	Solid fat contents and softening points of blends containing hydrogenated cottonseed oil (45 min) and Japanese pastry margarine ... ..	70
11	Solid fat contents and softening points of blends containing hydrogenated palm oil and Japanese pastry margarine . ... ..	71
12	Solid fat contents and softening points of blends containing hydrogenated palm oil (15 min) and Japanese pastry margarine .. ...	73

13	Fatty acid compositions of blends 5 and 12, and Japanese pastry margarine .. ... ..	74
14	Triacylglycerol compositions of blends 5 and 12, and Japanese pastry margarine ... ..	75
15	Solid fat contents of blends 5 and 12, and Japanese pastry margarine .. ... ..	76
16	Analysis of blend 16 .. ... ..	80
17	Composition and hardness values of pastry margarine made from blend 16 ... ..	83
18	Composition and hardness values of butter made from milkfat ... ..	85
19	Physical evaluation of danish pastries ... ..	87
20	Sensory evaluation of danish pastries ... ..	94
21	Average hardness values of butter, experimental pastry margarine and Japanese pastry margarine .	102
22	Solid fat contents of butter, blend 16 and Japanese pastry margarine .. ... ..	102

LIST OF FIGURES

<u>No.</u>		<u>page</u>
1	Diagram of a scraped surface heat exchanger ...	3
2	Diagram of a chilled drum .. ... ..	3
3	Melting curves for soft and table margarines ...	10
4	Diagram of continuous buttermaker ... ..	12
5	The chromatogram of Japanese pastry margarine which contains short chain fatty acids ... ..	22
6	The chromatogram of cottonseed oil hydrogenated to different times by the very selective catalyst	24
7	Diagram of hydrogenation vessel . ... ..	31
8	Photograph of filter .. ... ..	34
9	Diagram of deodorization apparatus ... ..	35
10	Photograph of a z-blade reworker ... ..	37
11	Flow process chart of manufacturing method I ...	38
12	Flow process chart of manufacturing method II ..	40
13	Flow process chart of manufacturing method III .	42
14	Photograph of equipment used in the manufacturing method III .. ... ..	43
15	Flow process chart of manufacturing method IV ..	44
16	Photograph of equipment used in the manufacturing method IV ... ..	45

17	The melting thermograms of Japanese pastry margarine obtained after tempering by methods D1 and D2 ... ..	50
18	The melting thermograms of milkfat obtained after tempering by methods D1 and D2 .. ...	53
19	Curves of solid fat content of Japanese pastry margarine and milkfat obtained after tempering by method S1 ... ..	54
20	Hydrogenation of cottonseed oil with an active catalyst (method A). Curves of softening point, iodine value and refractive index ... ..	58
21	Hydrogenation of cottonseed oil with an active catalyst (method A). Curves of fatty acid composition ... ..	58
22	Hydrogenation of cottonseed oil with an active catalyst (method A). Curves of solid fat content hydrogenated to different times . ... ..	59
23	Hydrogenation of cottonseed oil with a very selective catalyst (method B). Curves of softening point, iodine value and refractive index ...	61
24	Hydrogenation of cottonseed oil with a very selective catalyst (method B). Curves of fatty acid composition . ... ..	61
25	Hydrogenation of cottonseed oil with a very selective catalyst (method B). Curves of solid fat content hydrogenated to different times ...	63
26	Hydrogenation of palm oil with a very selective catalyst (method C). Curves of softening point, iodine value and refractive index ... ..	65

27	Hydrogenation of palm oil with a very selective catalyst (method C). Curves of fatty acid composition ... ..	65
28	Hydrogenation of palm oil with a very selective catalyst (method C). Curves of solid fat content hydrogenated to different times . ... ..	66
29	The melting thermograms for blend 5, obtained after tempering by methods D1 and D2 . ... ..	77
30	The melting thermograms for blend 12, obtained after tempering by methods D1 and D2 . ... ..	78
31	The melting thermograms of blend 16 obtained after tempering by methods D1 and D2 .. ... ..	81
32	Photograph of danish pastries made from Japanese pastry margarine . ... ..	88
33	Photograph of a 'windmill' danish pastry made from Japanese pastry margarine .. ... ..	88
34	Photograph of danish pastries made from butter .	89
35	Photograph of a 'windmill' danish pastry made from butter . ... ..	89
36	Photograph of danish pastries made from pastry margarine A . ... ..	90
37	Photograph of a 'windmill' danish pastry made from pastry margarine A ... ..	90
38	Photograph of danish pastries made from pastry margarine B . ... ..	91
39	Photograph of a 'windmill' danish pastry made from pastry margarine B ... ..	91

LIST OF APPENDICES

<u>No.</u>		<u>page</u>
1	Hydrogenation vessel .. ...	105
2	Hydrogenation filter .. ...	106
3	Method of making danish pastries ... ..	107
4	Schedule for making danish pastries .. ...	113
5	Questionnaire for sensory evaluation of danish pastry . ... ..	116
6	Sensory evaluation of danish pastries on the first baking day .. ... ..	118
7	Sensory evaluation of danish pastries on the second baking day .. ... ..	119
8	Sensory evaluation of danish pastries on the third baking day .. ... ..	120

## 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. C<sub>38</sub> 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.