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A STUDY OF THE STRUCTURE OF  
TRIACYLGLYCEROLS OF BOVINE MILK FAT

A thesis presented for the degree of  
Doctor of Philosophy  
in Biochemistry  
at Massey University

by

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1973

## SUMMARY

Samples of milk fat obtained at different stages of the dairying season were investigated to determine the influence of the observed seasonal changes in the fatty acid (FA) compositions of New Zealand milk fats on the structure of milk triacylglycerols (TG's). Of the three milk fats studied the January and March samples had FA compositions typical of hard summer milk fat, while the September sample had a FA composition typical of soft spring milk fat.

Each of the three selected samples of milk fat was effectively separated into TG fractions of high, medium and low molecular weight which had distinctly different FA and TG compositions. Stereospecific analyses of these fractions showed that in TG fractions of similar average molecular weight the arrangement of FA's within the TG's was similar and that in all TG fractions the FA's were arranged within positions 1, 2 and 3 of the TG's in a highly selective manner.

The TG fractions were separated into TG classes of different degrees of unsaturation. Corresponding TG classes of the three samples of milk fat had generally comparable FA compositions. However an important distinguishing feature was that each TG fraction of the September sample contained a higher proportion of unsaturated TG's than the corresponding TG fractions of the January and March samples.

Thus in New Zealand milk fats of differing FA composition, the nature of the TG species is similar but there exist differences in the relative proportions of the TG species. The variation in the proportions of the constituent TG species of New Zealand milk fat would appear to be the overriding factor which influences the seasonal variation in its physical characteristics.

The thermal properties of TG fractions of milk fat were examined with a view to determining the influence of TG structure on the physical characteristics of milk fat. It was found that the unsaturated TG's of low molecular weight, were largely responsible for the considerable proportion of milk fat which melted below 0°C and consequently for the wide melting range which is characteristic of milk fat. The structural difference between these TG's and the remaining TG's of milk fat was found to be sufficiently large to prevent significant formation of solid solutions. Consequently the wide melting range of milk fat is due to both the large number of different TG species and to the large structural difference between the various TG species.

## ACKNOWLEDGEMENTS

The author wishes to thank Dr J.C. Hawke for his excellent supervision of this work.

The author also wishes to thank Mrs G.E. Norris for carrying out thermal analyses and Mr R. Norris for helpful comments on the manuscript.

Thanks are extended to Mrs R. Haggett for typing this thesis and to Miss M. Atkinson for preparing the figures.

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## NOMENCLATURE OF LIPIDS

For lipids containing glycerol the nomenclature suggested by the IUPAC-IUB Commission on Biochemical Nomenclature (Biochem J. (1967). 105, 897) is followed. However, for sake of brevity abbreviations are used, e.g. 2,3-diacyl-sn-glycerol 1-phosphoryl phenol is referred to as 2,3-PL's.

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

For sake of brevity bovine milk fat is referred to as milk fat.