

Thesis Title Study on Lipase-catalyzed Interesterification of Palm Oil with n-3 Fatty Acids and the Effect of its Product on Blood Lipids of Rabbits

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#### ABSTRACT

The work carried out in this study involved preparation of n-3 fatty acid-enriched palm oil and its biological effect on plasma lipids of rabbits. The modified palm oil was prepared by interesterification of palm oil with n-3 fatty acid concentrate using *A. niger* lipase immobilized on celite as catalyst. The n-3 fatty acid concentrate was prepared from fish lipid or cod liver oil by urea complexation method. The optimum condition for interesterification was at 20-30°C, pH 5.6, in hexane containing 0.9% water, using immobilized enzyme at 15% enzyme (% by weight of enzyme power loaded onto celite) and 15% enzyme content (weight of immobilized enzyme by weight of substrate). The n-3 fatty acid-enriched palm oil product contained 44% n-3 fatty acids (19% eicosapentaenoic acid and 25% docosahexaenoic acid) with 84±10% yield. The interesterification without organic solvent but using

the same reaction condition gave a product containing 47% n-3 fatty acids.

The effects of n-3 fatty acid-enriched palm oil on plasma lipids and lipoprotein cholesterol were studied in rabbits with hypercholesterolemia induced by feeding a high cholesterol diet. Supplementation of n-3 fatty acid-enriched palm oil for 8 weeks at two different doses, 3 and 6 ml/week, could not significantly reduce plasma total cholesterol but caused a significant reduction in serum triglyceride and VLDL-cholesterol level after 4 weeks of feeding. Erythrocytes of rabbits supplemented with n-3 fatty acid-enriched palm oil for 8 weeks showed the presence of eicosapentaenoic and docosahexaenoic acids in erythrocyte lipids in correlation with their amounts in dietary lipids. Rabbits fed polyunsaturated fatty acid enriched-palm oil showed no reduction in plasma vitamin E level when compared with that supplemented with palm oil. The results obtained indicated that the modified palm oil prepared in this study had no hypocholesterolemic effect but could reduce plasma triglycerides in rabbits fed a high cholesterol diet.