

This Final Year Project Report entitled “**Optimisation of Cholesterol Reduction in Prawn by *Lactobacillus bulgaricus* Yoghurt using Response Surface Methodology (RSM)**” was submitted by Norazwa Binti Othman, in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons.) Food Science and Technology, in the Faculty of Applied Sciences, and was approved by

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## TABLE OF CONTENTS

	<b>Page</b>
<b>ACKNOWLEDGEMENTS</b>	ii
<b>TABLE OF CONTENTS</b>	iii
<b>LIST OF TABLES</b>	v
<b>LIST OF FIGURES</b>	vi
<b>LIST OF ABBREVIATIONS</b>	vii
<b>ABSTRACT</b>	viii
<b>ABSTRAK</b>	ix
<b>CHAPTER 1 INTRODUCTION</b>	
1.1 Background and problem statements	1
1.2 Significance of study	2
1.3 Objectives of study	3
<b>CHAPTER 2 LITERATURE REVIEW</b>	
2.1 Cholesterol	4
2.1.1 Properties	5
2.1.2 Lipoprotein and cholesterol metabolism	6
2.1.3 Effects on human health	8
2.2 <i>Lactobacillus bulgaricus</i>	
2.2.1 <i>Lactobacillus bulgaricus</i> characteristic	10
2.2.2 Assimilation of cholesterol by <i>Lactobacillus bulgaricus</i>	11
2.3 <i>Streptococcus thermophilus</i>	12
2.4 <i>Lactobacillus bulgaricus</i> yoghurt	13
2.5 Prawn ( <i>Fenneropenaeus merguensis</i> )	15
2.6 Response surface methodology	
2.6.1 Introduction	17
2.6.2 Advantages of response surface methodology	18
2.6.3 Application of analytical method	18
<b>CHAPTER 3 METHODOLOGY</b>	
3.1 Materials	20
3.2 Sample preparation and treatment	20
3.2.1 Production of <i>Lactobacillus bulgaricus</i> yoghurt	20
3.3 Experimental design and data analysis	22
3.4 Physical analysis	
3.4.1 Rheological analysis of <i>L. bulgaricus</i> yoghurt	23
3.5 Microbiological analysis	
3.5.1 Enumeration	
3.5.1.1 Bacteriological peptone diluents and de Man, Rogosa and Sharpe (MRS) agar.	24
3.5.1.2 Enumeration procedure	25

## ABSTRACT

### OPTIMISATION OF CHOLESTEROL REDUCTION IN PRAWN BY *LACTOBACILLUS BULGARICUS* YOGHURT USING RESPONSE SURFACE METHODOLOGY (RSM)

The purpose of this study was to optimise the cholesterol reduction in prawn by *L. bulgaricus* yoghurt using Response Surface Methodology (RSM) of MINITAB Software (Version 14). Experimental design was created by RSM whereby test variables; pH of prawn, amount of yoghurt (%), incubation temperature ( $^{\circ}\text{C}$ ) and incubation time (minutes) were used. Whole part of prawn were blended, changed the pH and mixed thoroughly in different amounts of *L. bulgaricus* yoghurt and treated differently in terms of incubation temperature and incubation time as suggested by the experimental design of RSM. The optimal centrifugal speed was investigated and relative centrifugal field (RCF) of 1000 x g at the temperature of  $2^{\circ}\text{C}$  for 10 minutes showed the best performance. This speed was able to give 53.57% reduction in total fat content of prawn. This centrifugation condition was used to determine the optimum amount of cholesterol reduced in treated prawn. Cholesterol analysis was carried out according to AOAC Official Method 994.10 and measured using Gas Chromatography: with Flame Ionization Detector (GC-FID). Cholesterol content in prawn was reduced to 75.85% at the optimum condition; pH 6.41 of prawn, 16.3% of *L. bulgaricus* yoghurt,  $36.2^{\circ}\text{C}$  of incubation temperature and 30 minutes of incubation time. Verification experiment was also carried out and it was found that there was significantly different at the 5% level between predicted and verified values of cholesterol reduction using the optimum condition determined by RSM. In addition, the significant regression equations or models at the 5% level of confidence interval were also established for the estimation of the percentage reduction of cholesterol in prawn treated by *L. bulgaricus* yoghurt. This indicates that *L. bulgaricus* yoghurt is a potential medium to be employed to reduce cholesterol in prawn.

## CHAPTER 1

### INTRODUCTION

#### 1.1 Background and problem statements

Cholesterol is a lipid found in the cell membranes of all tissues, and it is transported in the blood plasma of all animals. Most of the cholesterol is synthesized by the body and some has dietary origin. Cholesterol is more abundant in tissues which either synthesize more or have more abundant densely-packed membranes. Cholesterol is insoluble in blood, but is transported in the circulatory system bound to one of the varieties of lipoprotein, spherical particles which have an exterior composed mainly of water-soluble proteins (Arnold and Kwiterovich, 2003).

The American Heart Association recommends a restriction of dietary cholesterol to 300 mg per day. Cholesterol can build up on the inside the blood vessels of human heart. If too much cholesterol builds up in the blood (hypercholesterolemia), then the blood cannot flow through to human heart and cause a heart attack (Hui, 1996).

Yoghurt was produced by the fermentation of pasteurised milk using yoghurt (a commercial yoghurt culture containing *S. thermophilus* and *L.*