

ACKNOWLEDGEMENTS

Praise and gratitude to God for His blessings that this thesis entitled “PRODUCTION OF DURIAN POWDERED DRINK BY MEANS OF FOAM MAT DRYING” could come to completion. This thesis is written as a partial fulfillment of the academic requirements to obtain degree of *Sarjana Teknologi Pertanian Strata Satu* in Food Technology Study Program, Faculty of Science and Technology of Universitas Pelita Harapan, Tangerang.

The author realizes that this thesis would not successfully come to completion without the guidance, prayers and support from several parties. In this occasion, the author would like to give the sincerest gratitude and appreciation to:

1. Eric Jobiliong, Ph.D., as the Dean of Science and Technology Faculty.
2. Ir. W. Donald R. Pokatong, M.Sc., Ph.D., as the Head of Food Technology Study Program, for the opportunity to conduct this research and approval of this thesis report.
3. Dr.-Ing Azis Boing Sitanggang, S. TP, M.Sc., as the main supervisor for the guidance, support, patience, information and advice during the process and completion of this thesis report.
4. Intan Cidarbulan Matita, Ph.D., as the co-supervisor for the help, guidance, support and patience during the process and completion of this thesis report.
5. Dr. Tagor M. Siregar, Head of Chemistry Laboratory, and Dr. Adolf J. N. Parhusip, Head of Microbiology Laboratory, as head of examiner and member of examiner respectively for the helpful insight during thesis period.

6. Yuniwaty Halim, M.Sc.. as the Head of Quality Control Laboratory for the opportunity to conduct research in the laboratory.
7. Natania, M.Eng., as the Head of Food Processing Technology Laboratory for the opportunity to conduct this research.
8. Mr. Andra and Ms. Virly as the lecturer assistant, for the guidance and helpful insights during this research.
9. Mr. Adzie, Mr. Darius, Mr. Adi and Mr. Yosafat as laboratory assistance for the help and guidance during thre research.
10. All lecturers and staff of Food Technology Department at Universitas Pelita Harapan.
11. Beloved parents, brother and family for the support and prayers.
12. Julian Adrian Halim for the help and support during thesis work and completion.
13. Wiliyanti Sutanto, Grace Derica, Joshua Febryan and Coco for the support and consolation during thesis completion.
14. All friends in Food Technology Class C 2013 and 2014 for the information and time spent together.

It is realized that this report is far from perfection. Criticism and suggestions are highly appreciated for better improvement in the future. The author hopes that this thesis report will be useful for the readers.

Tangerang, January 2018

Author

TABLE OF CONTENTS

COVER

STATEMENT OF THESIS AUTHENTICITY

APPROVAL BY THESIS SUPERVISORS

APPROVAL BY THESIS EXAMINATION COMMITTEE

ABSTRACT iv

ACKNOWLEDGEMENTS..... vi

TABLE OF CONTENTS..... viii

LIST OF TABLES x

LIST OF FIGURES xi

LIST OF APPENDICES xii

CHAPTER I INTRODUCTION

1.1 Background..... 1

1.2 Research Problem 2

1.3 Objectives 3

1.3.1 General Objectives..... 3

1.3.2 Specific Objectives..... 3

CHAPTER II LITERATURE REVIEW

2.1 Durian (*Durio zibethinus Murr.*)..... 4

2.2 Instant Powdered Drink 5

2.3 Foam Mat Drying..... 6

2.3.1 Foaming Process 8

2.3.2 Drying Process 8

2.4 Foaming Ability of Albumen..... 9

2.5 Carboxymethyl Cellulose (CMC)..... 10

CHAPTER III RESEARCH METHODOLOGY

3.1	Materials and Equipment	12
3.2	Research Procedure.....	12
3.2.1	Preliminary Stage	12
3.2.2	Main Research.....	14
3.3	Experimental Design.....	16
3.4	Method of Analysis.....	19
3.4.1	Physical Characteristic Analysis	19
3.4.1.1	Yield	19
3.4.1.2	Stability of Solution.....	20
3.4.1.3	Color.....	20
3.4.2	Chemical Characteristic Analysis	21
3.4.2.1	Total Dissolved Solids (TDS)	21
3.4.2.2	Antioxidant Activity.....	21
3.4.3	Additional Analysis.....	22
3.4.3.1	Particle size.....	22
3.4.3.2	Gas Chromatography-Mass Spectrometry (GC-MS).....	22
3.4.3.3	High Performance Liquid Chromatography (HPLC).....	23
3.4.3.4	<i>Salmonella</i> Detection	23
3.4.3.5	<i>Escherichia coli</i> Detection	23
3.4.3.6	Coliform Detection.....	24
3.4.3.7	<i>Staphylococcus aureus</i> Detection.....	24

CHAPTER IV RESULTS AND DISCUSSIONS

4.1	Preliminary Stage.....	25
4.2	Effect of Pulp to Water Ratio and Addition of CMC towards Foam Mat Drying of Durian	28
4.2.1	Yield.....	29
4.2.2	Antioxidant Activity	30
4.2.3	Stability	31
4.2.4	Total Dissolved Solids	32

4.2.5	Color.....	32
4.3	Effect of Mixing Time and Albumen Concentration towards Foam Mat Drying of Durian	34
4.3.1	Yield.....	35
4.3.2	Antioxidant Activity	36
4.3.3	Stability	37
4.3.4	Total Dissolved Solids	37
4.3.5	Color.....	38
4.4	Effect of Drying Time and Temperature towards Foam Mat Drying of Durian	39
4.4.1	Yield.....	40
4.4.2	Antioxidant Activity	41
4.4.3	Stability	42
4.4.4	Total Dissolved Solids	42
4.4.5	Color.....	43
4.5	Optimum Conditions of Foam Mat Drying for Production of Durian Instant Drink	44
4.5.1	Particle Size.....	45
4.5.2	High Performance Liquid Chromatography (HPLC).....	46
4.5.3	Gas Chromatography-Mass Spectrometry (GC-MS).....	48
4.5.4	Bacteria Detection Test.....	51
 CHAPTER V CONCLUSIONS AND SUGGESTIONS		
5.1	Conclusions.....	53
5.2	Suggestions	54
 BIBLIOGRAPHY		
		55
 APPENDICES		
		60

LIST OF TABLES

Table 2.1 The nutrient composition of durian per 100 g weight.....	5
Table 2.2 The ingredients of instant powdered drink	6
Table 3.1 Experimental design of research stage I	18
Table 3.2 Experimental design of research stage II	18
Table 3.3 Experimental design of research stage III.....	18
Table 4.1 Pseudo value and range of processing of foam mat dried durian	28
Table 4.2 Average value and standard deviation of yield, stability, total dissolved solids, total color difference and radical scavenging activity between combination of pulp to water ratio and carboxymethyl cellulose (CMC) concentration.....	29
Table 4.3 Average value and standard deviation of yield, stability, total dissolved solids, total color difference and radical scavenging activity between combination of mixing time and albumen concentration	35
Table 4.4 Average value and standard deviation of yield, stability, total dissolved solids, total color difference and radical scavenging activity between combination of drying temperature and drying time.....	40
Table 4.5 Value of yield, stability, total dissolved solids, total color difference and radical scavenging activity of foam mat dried durian made with optimum formulation.....	45
Table 4.6 List of polar volatile compounds contained in foam mat dried durian powder	50
Table 4.7 List of antioxidant compounds contained in foam mat dried durian powder	51
Table 4.8 Result of bacteria detection test	51

LIST OF FIGURES

Figure 2.1 Durian (<i>Durio zibethinus Murr.</i>)	5
Figure 2.2 Flowchart of foam mat drying process	7
Figure 3.1 Flowchart of foam mat drying of durian.....	13
Figure 4.1 Effect of pulp to water ratio and carboxymethyl cellulose (CMC) concentration toward yield of instant drink powder.	30
Figure 4.2 Effect of pulp to water ratio and carboxymethyl cellulose (CMC) concentration toward a) radical scavenging activity at 5000 ppm, b) stability, c) total dissolved solids and d) total color difference of instant drink powder	34
Figure 4.3 Effect of egg albumen concentration and mixing time toward yield of instant powdered drink.....	36
Figure 4.4 Effect of egg albumen concentration and mixing time toward a) radical scavenging activity at 5000 ppm, b) stability, c) total dissolved solids and d) total color difference of instant powdered drink	39
Figure 4.5 Effect of drying temperature and drying time toward yield of instant powdered drink.....	41
Figure 4.6 Effect of drying temperature and drying time toward a) radical scavenging activity at 5000 ppm, b) stability, c) total dissolved solids and d) total color difference of instant powdered drink.	44

LIST OF APPENDICES

Appendix A Statistical Analysis of Yield (Pulp to Water Ratio and Addition of CMC).....	A-1
Appendix B Statistical Analysis of Antioxidant Activity (Pulp to Water Ratio and Addition of CMC)	B-1
Appendix C Statistical Analysis of Stability (Pulp to Water Ratio and Addition of CMC).....	C-1
Appendix D Statistical Analysis of TDS (Pulp to Water Ratio and Addition of CMC).....	D-1
Appendix E Statistical Analysis of Color (Pulp to Water Ratio and Addition of CMC).....	E-1
Appendix F Statistical Analysis of Yield (Mixing Time and Egg Albumen Concentration)	F-1
Appendix G Statistical Analysis of Antioxidant Activity (Mixing Time and Egg Albumen Concentration)	G-1
Appendix H Statistical Analysis of Stability (Mixing Time and Egg Albumen Concentration)	H-1
Appendix I Statistical Analysis of TDS (Mixing Time and Egg Albumen Concentration).....	I-1
Appendix J Statistical Analysis of Color (Mixing Time and Egg Albumen Concentration).....	J-1
Appendix K The Making of Foam Mat Dried Durian	K-1
Appendix L Statistical Analysis of Yield (Drying Time and Temperature).....	L-1
Appendix M Statistical Analysis of Antioxidant Activity (Drying Time and Temperature).....	M-1
Appendix N Statistical Analysis of Stability (Drying Time and Temperature).....	N-1
Appendix O Statistical Analysis of TDS (Drying Time and Temperature).....	O-1

Appendix P Statistical Analysis of Color (Drying Time and Temperature).....	P-1
Appendix Q Particle Size Analysis	Q-1
Appendix R High Performance Liquid Chromatography (HPLC)	R-1
Appendix S Bacterial Detection Test.....	S-1
Appendix T Gas Chromatography-Mass Spectrometry (GC-MS).....	T-1

