



TABLE OF CONTENTS

| | |
|---|------|
| ACKNOWLEDGEMENTS | v |
| TABLE OF CONTENTS | viii |
| LIST OF TABLES | x |
| LIST OF FIGURES | xi |
| LIST OF APPENDICES | xii |
| CHAPTER I INTRODUCTION | 15 |
| 1.1. Research Background | 15 |
| 1.2. Research Problems | 17 |
| 1.3. Objectives | 17 |
| CHAPTER II LITERATURE REVIEW | 18 |
| 2.1. Fava Bean | 18 |
| 2.2. Protein Hydrolysate | 19 |
| 2.3. Threadfin Bream | 21 |
| 2.4. Surimi | 22 |
| 2.5. Surimi Gel | 23 |
| 2.6. Hypothesis | 27 |
| CHAPTER III RESEARCH METHODOLOGY | 28 |
| 3.1. Time and Location of Research | 28 |
| 3.2. Materials | 28 |
| 3.2.1. Raw materials | 28 |
| 3.2.2. Chemicals | 28 |
| 3.3. Instruments | 28 |
| 3.4. Methods | 29 |
| 3.4.1. Research Design | 29 |
| 3.4.2. Determine the condition of fava bean protein hydrolysates | 31 |
| 3.4.3. Characterization of Fava Bean Protein Hydrolysates | 31 |
| 3.4.4 Preparation of surimi gel | 34 |
| 3.4.5 Characterization of surimi gel | 35 |
| 3.4.6 Statistical analysis | 37 |
| CHAPTER IV RESULT AND DISCUSSION | 38 |
| 4.1. Determine the conditions of fava bean protein hydrolysates (FBPH) | 38 |
| 4.2 Characterization of fava bean protein hydrolysates (FBPH) | 40 |
| 4.2.1 Antioxidant activities | 40 |
| 4.2.2 Amino acid composition | 43 |
| 4.3 Characterization of surimi gels | 45 |



| | |
|---|-----------|
| 4.3.1 Breaking force and deformation | 45 |
| 4.3.2 Color | 48 |
| 4.3.3 Texture profile analysis..... | 49 |
| 4.3.4 Expressible moisture content | 50 |
| 4.3.5 Sensory properties | 51 |
| 4.3.6. Microstructure..... | 52 |
| CHAPTER V CONCLUSION AND SUGGESTION | 54 |
| 5.1. Conclusion..... | 54 |
| 5.2. Suggestion..... | 54 |
| REFERENCES | 55 |
| APPENDICES | 62 |



LIST OF TABLES

| | |
|---|-----------|
| Table 2. 1. Proximate composition of dehulled fava bean powder (%)..... | 18 |
| Table 4. 1. Different FBPH concentration (2%, 4%, 6%) (w/v) and enzyme concentration (2%, 4%, and 6%) (v/w) on the degree of hydrolysis (%)..... | 39 |
| Table 4. 2. Antioxidant assay results of fava bean protein hydrolysates (FBPH) with degree of hydrolysis (DH) of 20% and 30%. | 40 |
| Table 4. 3. Amino acid composition of FBPH with 30% DH | 43 |
| Table 4. 4. Texture profile analysis (TPA) of surimi gel with no addition (control) and addition of 1%, 2%, 3%, and 4% FBPH. | 49 |
| Table 4. 5. Sensory evaluation of surimi gel without (control) and with the addition of 2% FBPH | 51 |



LIST OF FIGURES

| | |
|--|----|
| Figure 2. 1. Myosin structure | 23 |
| Figure 2. 2. Thermal aggregation of fish myosin | 24 |
| Figure 2. 3. Process of gelation in surimi..... | 24 |
| Figure 2. 4. Stages of protein gelation with the changes in storage modulus (G') | 26 |
| Figure 3. 1. Research design of the study..... | 30 |
| Figure 4.1. Degree of hydrolysis for various times (0, 5, 15, 30, 60, 120, and 180 minutes) with different alcalase enzyme concentrations (0.5%, 1%, 2%, and 3%) | 38 |
| Figure 4. 2. Breaking force of surimi gel without and with the addition of FBPH with different concentrations (1%, 2%, 3%, and 4%) | 45 |
| Figure 4. 3. Deformation of surimi gels without (control) and with the addition of different concentrations of FBPH (1%, 2%, 3%, and 4%)..... | 46 |
| Figure 4. 4. Whiteness of surimi gels added without (control) and with different concentrations of FBPH (1%, 2%, 3%, and 4%)..... | 48 |
| Figure 4. 5. Expressible moisture content of surimi gel without and with the addition of FBPH with different concentrations..... | 50 |
| Figure 4. 6. Microstructure of surimi gel without the addition of FBPH (control) (a), 1% FBPH (b), 2% FBPH (c), 3% FBPH (d), and 4% FBPH (e). | 52 |



LIST OF APPENDICES

| | |
|---|----|
| APPENDICES | 62 |
| I. Raw Data | 62 |
| 1.1. Time of hydrolysis | 62 |
| 1.2. Variation of Solid Content and Enzyme | 65 |
| 1.3. Antioxidant Activity Analysis | 67 |
| 1.4. Characterization of surimi gel | 70 |
| II. ANOVA Results | 77 |
| 2.1. Determine the Conditions of Fava Bean Protein Hydrolysates (FBPH) | 77 |
| 2.2. Antioxidant activities | 81 |
| 2.3. Characterization of surimi gel | 83 |
| III. Documentation | 89 |
| 3.1. Determine the conditions of fava bean protein hydrolysates (FBPH) | 89 |
| 3.2. Antioxidant analysis | 89 |
| 3.3. Preparation of surimi gel | 90 |
| 3.4. Characterization of surimi gel | 90 |