

ESTIMATION OF ENVIRONMENTAL IMPACTS OF GARFISH
FARM WASTE USING RESPONSE SURFACE METHODOLOGY

THESIS SUBMITTED TO THE

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Optimization of enzymatic hydrolysis of protein from catfish waste using response surface methodology / Mohd Hafifi Abd Kadir.

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OPTIMIZATION OF ENZYMATIC HYDROLYSIS OF PROTEIN
FROM CATFISH WASTE USING RESPONSE SURFACE
METHODOLOGY

By
Mohd Hafifi B Abd Kadir

Research Report submitted in partial fulfillment of
the requirement for the degree of
Bachelor of Food Science (Food Service and Nutrition)

Department of Food Science
FACULTY OF AGROTECHNOLOGY AND FOOD SCIENCE
UNIVERSITI MALAYSIA TERENGGANU
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oleh *Mohd Hafizi Abd Kadir*, No.Matrik *UK12392*

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DECLARATION

I hereby declare that the work in this thesis is my own except for quotation and summaries which have been duly acknowledged.

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ABSTRACT

This study is about optimization of enzymatic hydrolysis process of frame waste from local catfish, African catfish, *Clarias gariepinus*. In order to determine the optimum condition of the hydrolysis, range of parameters were chose according to related previous study. Those parameters are temperature, time, enzyme concentration and pH. Enzyme used was Alcalase. Arrangement of the level of parameter was based on a design in response surface methodology which is Central Composite design. Proximate analysis was carried out on the raw material and also fish protein hydrolysate to see the comparison of the content before and after undergoes hydrolysis process. As a result, the optimum conditions to achieve maximum degree of hydrolysis were temperature of 60⁰C, time of 180 min, pH of substrate at 9.5 and an enzyme concentration of 2.0%. Regression of coefficients indicates that all linear forms, which are temperature, time, E/S ratio and pH, and temperature² were significant ($P < 0.05$). The product which is catfish frame waste hydrolysate has high protein content and many potential benefits such as animal feed and supplement for human can be developed through further study. Pollution problem that caused by the disposal of the waste may also be decreased.

ABSTRAK

Kajian ini adalah mengenai mengoptimumkan proses hidrolisis berenzim yang dilakukan ke atas ikan keli tempatan iaitu Keli Afrika, *Clarias gariepinus*. Dalam usaha untuk menentukan keadaan hidrolisis yang terbaik, nilai bagi parameter yang digunakan dipilih berdasarkan kajian lepas yang berkaitan. Parameter-parameter tersebut ialah suhu, masa, kepekatan enzim, dan pH. Enzim yang digunakan adalah Alcalase. Susunan level bagi parameter-parameter adalah berdasarkan kaedah 'response surface methodology' iaitu rekaan 'Central Composite'. Analisis proksimat telah dijalankan ke atas bahan mentah dan juga hasil hidrolisis untuk melihat perbandingan kandungan sampel sebelum dan selepas proses hidrolisis. Keputusan yang diperolehi bagi mencapai peratus hidrolisis tertinggi adalah pada keadaan suhu 60⁰C, masa 180 minit, kepekatan enzim 2.0% dan pH 9.5. Regresi bagi pekali menunjukkan semua faktor dalam bentuk persamaan linear iaitu suhu, masa, kepekatan enzim dan pH adalah penting ($P < 0.05$). Produk yang terhasil melalui proses hidrolisis adalah tinggi kandungan protein serta mempunyai banyak kegunaan yang boleh dikembangkan melalui kajian selanjutnya seperti bahan makanan haiwan dan 'supplement' bagi manusia. Masalah pencemaran yang disebabkan oleh pelupusan sisa buangan tersebut juga dapat dikurangkan.