



***THE EVALUATION OF AMINO ACID PROFILES OF GIANT AFRICAN  
SNAIL AND GOLDEN APPLE SNAIL AS POULTRY FEED SUPPLEMENT***

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**A project report submitted to the Faculty of Agriculture Universiti Putra  
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## CERTIFICATION

This project entitled "The Evaluation of Amino Acid Profiles of Giant Apple Snail and Golden Apple Snail as Poultry Feed Supplement" was prepared by Nor Ainzah Binti Feshal and submitted to the Faculty of Agriculture in partial fulfillment of the requirements of the course SHW 4999 (Final Year Project) for the Award of Bachelor of Agriculture (Animal Science).

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## ABBREVIATION

%	percent
°C	Celcius
AOAC	Association of Official Agricultural Chemist
cm	centimeter
CP	Crude protein
DM	Dry matter
FMOC	fluorenylmethyl chloroformate
GALS	Giant African Large Snail
GAS	Golden Apple Snail
g	gram
HCL	Hydrochloric acid
HPLC	High Performance Liquid Chromatography
Min	minutes
OPA	o-phthalaldehyde

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## ABSTRACT

This study was conducted to determine an amino acid profile of two snail *Pomacea canaliculata* (Golden Apple Snail) and *Achatina fulica* (Giant African Snail). A 500 g of snails was collected at Bukit Expo, Universiti Putra Malaysia. The analysis of amino acid was conducted in Nutrition Laboratory, Department of Animal Science, Faculty of Agriculture, Universiti Putra Malaysia. These snails were selected because they even now pest of crops. Moreover, the monogastric animal, especially poultry requires more amino acid rather than the ruminant animals. After the snail were collected, the edible part of snails were oven drying at 60°C for 3 days prior to proximate analysis. The flesh was examined for dry Matter (DM), ash, crude protein contents (CP) and amino acid. Data on DM, ASH, CP and amino acid were analyzed by T test using Statistical Analysis System 9.4 for Windows (SAS Inc., USA). Amino acid was evaluated using Agilent 1100 HPLC. The derivatization process using Agilent 1313A auto sampler. HPLC column that was ZORBAX Eclipse AAA 4.6 x 150 µm PN963400-902. The derivatization reagents consisted of borate buffer, fluorenylmethyl chloroformate (FMOC) and reagent and o-phthalaldehyde (OPA) reagent. The present study showed that the giant African snail contained 69.00% DM, 7.692 ASH, and 57.02 % CP while, the Golden Apple snail has 68.07%DM 7.67% ASH and 56.94% CP. The amino acid content in both snails slightly low and only four amino acid such as aspartate, serine, histidine and isoleusine shows a significant value ( $P < 0.05$ ) in comparing between Golden Apple snails and Giant African snails.

## ABSTRAK

Satu kajian telah dilakukan untuk menentukan kandungan profil asid amino dalam dua spesis siput iaitu siput babi (*Achatina fulica*) dan siput gondang emas (*Pomacea canaliculata*). Sebanyak 500g siput telah dikutip di sekitar bukit espo, Universiti Putra Malaysia. Analisa kandungan asid amino dilakukan di Makmal Analisa Pemakanan, Jabatan Sains Haiwan, Fakulti Pertanian, Universiti Putra Malaysia. Siput ini dipilih kerana tergolong dalam makhluk perosak. Haiwan monogastrik khususnya, unggas memerlukan acid amino lebih tinggi berbanding haiwan ruminat. Siput dikumpul dan kemudian dipisahkan dari kulit dan dagingnya. Daging-daging siput tersebut telah dikeringkan pada suhu 60°C selama 3 hari untuk analisis proksimate. Daging siput tersebut telah dianalisa untuk mengetahui kandungan bahan kering, abu, dan protein dan asid amino. Data bahan kering, abu, protein dan asid amino dianalisis menggunakan ujian T untuk analisa statistik sistem 9.4 for Windows (SAS Inc., USA). Untuk analisis asid amino, kajian telah dilakukan menggunakan Agilent 1100 HPLC. Proses derivasi menggunakan Agilent 1313A automatik sample dan menggunakan kolumm ZORBAX Eclipse AAA 4.6 x 150 µm PN963400-902. Derivatization reagen menggunakan pemangkin borate dan fluorenylmethyl chloroformate (FMOC) reagen dan o-phthalaldehyde (OPA) reagen. Kajian menunjukkan bahawa siput babi mengandungi 69.00% bahan kering, 7.692 % abu, dan 57.02% protein manakala siput gondang emas mengandungi 68.07% bahan kering, 7.67% abu dan 56.94% protein. Kandungan acid amino adalah rendah dan hanya aspartat, serina, histidina and isoleusina yang menunjukkan perbezaan ketara ( $P < 0.05$ ) dalam kedua-dua siput tersebut.

## CHAPTER 1

### INTRODUCTION

In recent years, total cost of the production, especially in livestock production keeps rising. About 60-70% cost of production is majorly coming from the feeds. The higher price of feedstuff will reflect in higher prices of the animal product such as meat, egg, and milk. In poultry production, energy sources constitute the largest component followed by the protein sources that can come from animals or plants. In Malaysia's total grain imports at 4.5 million tonnes in 2013-14 compared with 4.1 billion the year before based on the International Grains Council (IGC). The total includes 1.4 million tonnes of wheat, up from 1.3 million the year before and 3.1 million tonnes of maize, up from 2.8 million the prior year. Most of the feedstuffs such as soymeal and corn are comes primarily from Argentina.

In poultry, the common ingredient used in poultry feed formulations is grain. Grain is a major source of energy. Soybean meal comes from the plant sources usually used by the farmer to feed the chicken as protein sources. Protein sources derived from animals such as fish meal, meat meal and bone meal is the most costly comparing the protein sources from the plants.

Apart from that, plant protein sources generally have imbalances in nutritional in terms of essential amino acids, particularly in lysine, the first limiting factor in amino acids in cereals except of soybean meal. With their high prices, animal protein ingredient is usually used to balancing the amino acid content rather than as major sources of protein.

Fish meal are good sources of high quality proteins and it was really expensive. It also provides abundant amounts of minerals such as calcium, phosphorus and trace minerals. Higher level consumption in poultry diet may affect the meat and eggs. This because they may give fishy taint on meat and eggs. Thus, the future expansion possibility in fish meal production is limited. For the meat meal, it contains relatively high levels of protein, calcium and phosphorus. The quality of its protein varies in terms of amino acid content and digestibility. Tryptophan is the first limiting amino acid follow by lysine and methionine, in meat meal for poultry fed maize based. In some country, the utilization of the meat meal as feed has banned. To overcome all these problems, the snail such as Giant Africal Snails and Golden Apple Snails were introduced as a feed supplement especially in poultry production.

Giant African Snails or known as Giant African Land Snail, or in Malay called as "Siput Babi". The scientific name of this snail is *Achatina fulica*. The classification of phylum is from Mollusca, Class; Gastropoda, Order; Eupulmonata and family; Achatinidae. These snails were classified one of the most world largest and most damaging land snail pests. It also was included in 100 world's worst invaders. It was non host specific and can consume at least 500 different types of plant. This snail is native to coastal East Africa and highly adaptable to a wide range of environmental conditions. The characteristics of these snails are it can grow up to 20 cm to 12 cm in diameter. The fully grown Giant African Snail consist of 7-9 whorls with a moderately swollen body whorl and sharp conical spire.

Golden Apple Snails or known Golden kuhol, Channel Apple Snail, Keong Emas or Malay called as "Siput Gondang Emas". The scientific name of this snail is *pomacea canaliculata*. These snails from Family ampullariidae, Genus Pomacea. The Golden Apple Snails also categorize as one of the top 100 "World's Worst Invaders. The life

span of a Golden Apple snail more than 3 years old and becomes sexually mature when 2.5 cm in diameter. Its starts laying egg after 2 months of age. It has very high production and fertility. It can produce 8,000 eggs per year and 90% of eggs produce were hatched. The shell of this snail is globular, from 40-60 mm high and 45-75 mm wide, but can reach 150 mm in length. It also can live in dry mud up to 5 months and can be active back when the soil fill with water.

### **1.1 OBJECTIVES**

1. To determine the nutritive value of the flesh of the Golden Apple Snail and Giant African Snail.
2. To evaluate the amino acid content between Golden Apple Snail and Giant African Snail.

### **1.2 SIGNIFICANCE OF THE STUDY**

The Golden Apple Snail and Giant African Snail have potential as an alternative, sources of crude protein and amino acid for poultry feed as it is cheaper prices with high nutritive value.

### **1.3 HYPOTHESIS**

The different of mollusc species will give the different nutritive content and level of amino acid.

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