EFFECT OF INSECT CHITIN AS FEED SUPPLEMENT IN SELECTED CLINICAL BIOCHEMISTRY AND GROWTH PERFORMANCE OF THE BROILER CHICKENS

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CERTIFICATION

It is hereby certified that we have read this project paper entitled "Effect Of Insect Chitin As Feed Supplement In Selected Clinical Biochemistry And Growth Performance Of The Broiler Chickens" by Siti Nur Afiqah binti Juahari and in my opinion it is satisfactory in terms of scope, quality, and presentation as partial fulfillment of the requirement for the course VPD 4999 - Project.

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DEDICATIONS

This thesis is dedicated to

My parents,

Juahari bin Seran & Partini binti Parmon

For all their support, unconditional love and prayers.

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ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan kursus VPD 4999 – Projek.

KESAN SERANGGA CHITIN

SEBAGAI MAKANAN TAMBAHAN KEPADA PARAMETER BIOKIMIA KLINIKAL TERTENTU DAN PRESTASI PERTUMBUHAN DALAM AYAM PEDAGING.

Oleh

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Abstrak

Sebanyak 36 ekor anak ayam pedaging baka Ross berumur 21 hari dibahagi secara rawak kepada 1 daripada 3 pelakuan dalam kajian yang dijalankan untuk menentukan kesan makanan tambahan daripada chitin serangga (IC) terhadap pertumbuhan dan komposisi darah. Diet ujikaji terdiri daripada satu diet kawalan berasaskan jagung, mil kacang soya, bijirin dan bahan sampingan bijirin, pelakuan

kedua terdiri daripada diet kawalan ditambah dengan 1 g IC / kg diet, dan pelakuan ketiga terdiri daripada diet kawalan ditambah dengan 2 g IC / kg diet. Setiap pelakuan mempunyai 3 replikat dengan setiap replikat mengandungi 4 ekor ayam. Prestasi ayam pedaging dan komposisi metabolit darah diukur pada permulaan dan setiap 7 hari dalam tempoh 21 hari ujikaji. Sepanjang tempoh 21 hari ujikaji, ayam dalam kumpulan kawalan telah mencatatkan purata harian (ADG) yang tertinggi apabila di bandingkan dengan pelakuan yang mengandungi IC sebagai makanan tambahan tetapi perbezaan adalah tidak ketara. Tidak terdapat perbezaan yang ketara bagi ADG ayam diberi makan 2 g IC daripada ayam diberi makan 1 g IC walaupun ADG ayam bagi pelakuan 2 g IC adalah lebih baik.. Profil metabolit darah untuk semua diet pelakuan adalah sama. Kesimpulannya, makanan tambahan IC tidak memberi keasn terhadap peningkatkan ADG dan metabolit darah ayam pedaging. Kekurangan tindak balas ayam pedaging terhadap makanan tambahan IC dalam kajian ini berkemungkin disebabkan mutu IC yang rendah atau tahap IC diuji dalam kajian ini adalah terlalu rendah untuk haiwan untuk bertindak balas.

Kata kunci: *chitin serangga (IC), prestasi pertumbuhan, hematologi, serum biokimia, ayam pedaging.*

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfilment of the course VPD 4999 – Project.

EFFECT OF INSECT CHITIN

AS FEED SUPPLEMENT

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GROWTH PERFORMANCE OF THE BROILER CHICKENS.

by

SITI NUR AFIQAH BINTI JUAHARI

2015

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Abstract

A total of 36 twenty one day Ross broiler chicks were randomly allocated to 1 of 3 treatments in a study conducted to determine the effects of dietary supplementation of insect chitin (IC) on growth and blood composition. The experimental diets consisted of an unsupplemented basal control diet based on corn, soybean meal, and grain by-products, second treatment consisted of basal diet supplemented with 1 g

IC/kg of diet, and third treatment consisted of 2 g IC/kg of diet. Each treatment was fed to 3 replicate pens of birds, with 4 birds per pen. Broiler performance and blood metabolite indices were measured at the beginning and every 7 day during the 21 day experimental period. Throughout the 21 day experimental period the control group broilers recorded the highest average daily gain (ADG) than the other treatments but the difference was not significant. There was no significant difference in ADG of broilers fed 2 g of IC than broilers fed 1 g of IC even though broilers supplemented with 2 g IC recorded higher ADG. The blood metabolite profiles for all treatment diets were similar. In conclusion, dietary supplementation of IC appeared not to improve ADG and blood metabolites of broilers. Poor responses of broilers to IC supplementation in this study was probably due to low quality IC product or the level of IC tested in this study was too low for the animal to respond.

Keywords: *insect chitin (IC), growth performance, haematological, serum biochemistry, broiler chickens.*

Chapter 1

1.1 Introduction

Chitin is a copolymer of N-acetyl-D-glucosamine and D-glucosamine units linked with β-(1-4) glycosidic bond, where N-acetyl-D-glucosamine units are predominant in the polymeric chain. The deacetylated form of chitin refers to chitosan (Figure 1). Chitin and chitosan can be found as supporting materials in many aquatic organisms, terrestrial organisms, and some microorganisms (Tokura and Tamura, 2007). The interest in chitin study originates from the study of behaviour and chemical characteristics of lysozyme. This enzyme dissolves certain bacteria by cleaving the chitinous material of the cell walls. This made chitin resulted in a wide variety of medical applications that has been reported over the last three decades. Many reports showed that chitin has been implicated in a wide variety of applications including health beneficial and antimicrobial uses (Yalpani *et al.*, 1992; Howling *et al.*, 2001; Shahidi and Abuzaytoun, 2005). Antimicrobial effect brings benefit to the animal host in term of better gastro-intestinal activity and therefore promotes better growth and health status. Nowadays, commercially, chitins and chitosans are produced from biowastes obtained from aquatic organisms. The production of chitin and chitosan from biowastes of aquatic organisms in industrial scale appear in inconsistent physicochemical characteristics of products because of seasonal and variable supply of raw materials as well as variability and difficulties of process conditions (Nwe and Stevens, 2008). To overcome these problems, terrestrial organisms like insects, terrestrial crustaceans, and mushrooms are considered as alternative sources for the production of chitin and chitosan. Recently, the production of chitin and chitosan

from insect sources has drawn increased attention because chitin is also a primary component in insect cuticles. Therefore, insects are an alternative source of chitin and, consequently, of chitosan. First, insects possess enormous biodiversity and represent 95% of the animal kingdom. Therefore, they offer a tremendous potential as a natural resource for chitin and chitosan production. Until now, however, only limited numbers of insect species have been documented to be sources of chitin. One of the local insect that has the potential to be the source of chitin and chitosan is house cricket (HC) which is the most commonly found among cricket species in the country. The HC is easily adapted to domestic rearing and has not been seriously studied as a potential source of chitin or chitosan. In the present study, the prospect for using the exoskeleton of HC as a raw material for chitin will be tried out. This includes the extraction of chitin from HC by deproteinization and demineralization and chitosan by deacetylating the chitin. This study will evaluate chitin from HC comprehensively as alternative chitin source for poultry.

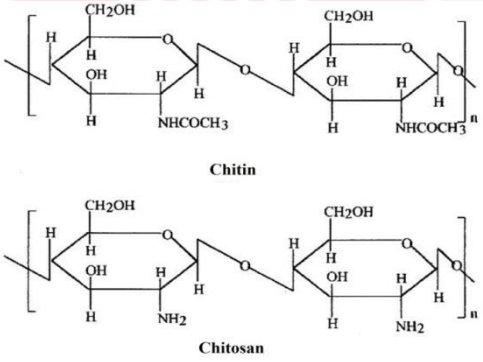

Figure 1 Chemical structure and the comparison between chitin and chitosan

1.2 Justification or rationale of study

The production of chitin and chitosan from biowastes of seafood by products in industrial scale which appear in inconsistent physicochemical characteristics variable supply of raw materials and processing (Nwe and Stevens 2008). To overcome these problems, terrestrial organisms like insects, terrestrial crustaceans, and mushrooms are considered as alternative sources for the production of chitin and chitosan. Chitin is a primary component in insect cuticles. Chitin is also found in internal structures of insects. Next to its occurrence in tracheal cuticles, it is also a constituent part of the peritrophic matrices that line the inner surface of the gut in many insects, protecting the intestinal epithelium from mechanical disruption, radical oxygen species and invasion by microorganisms (Barbehenn and Stannard, 2004). Furthermore, insect cuticles have lower levels of inorganic material compared to crustacean shells, which makes their demineralization treatment more convenient. Therefore, insects can be used as an alternative source of chitin and, consequently, of chitosan. Insects also possess enormous biodiversity and represent 95% of the animal kingdom.

1.3 Objective

To evaluate the growth performances and selected clinical biochemistry parameters in the broiler chickens.

1.4 Hypothesis

Supplementing broiler chickens diets with insect chitin will improve growth performances and selected clinical biochemistry parameters.

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