



UNIVERSITI PUTRA MALAYSIA

**EFFECT OF EXOGENOUS EMULSIFIER SUPPLEMENTATION ON
GROWTH PERFORMANCE, AND NUTRIENT DIGESTIBILITY IN
BROILER CHICKENS**

LEE CHIA YIN

FP 2015 184

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LEE CHIA YIN

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Universiti Putra Malaysia

2014/2015

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By

LEE CHIA YIN

164035

A Project report Submitted to Faculty of Agriculture,

Universiti Putra Malaysia,

**In Partial Fulfillment of the Requirement of SHW 4999 (Final Year
Project)**

For the Award of the Degree of

Bachelor of Agriculture (Animal Science)

Department of Animal Science

Faculty of Agriculture

Universiti Putra Malaysia

Serdang, Selangor

CERTIFICATION

The project report attached here entitled:

Effect of Exogenous Emulsifier Supplementation on Growth Performance, and Nutrient Digestibility in Broiler Chickens

And submitted by **Lee Chia Yin**

In partial fulfillment of the requirement of SHW 4999 (final year project) for the award of the degree of **Bachelor of Agriculture (Animal Science)** is hereby accepted.

Student's name:

Lee Chia Yin

Matric No.:

164035

Student's signature:

Certified by:

Professor Dr. Zulkifli bin Idrus

Project Supervisor

Department of Animal Science

Faculty of Agriculture

Universiti Putra Malaysia

Serdang, Selangor.

Date: _____

ACKNOWLEDGEMENT

Firstly, my thanks from the bottom of my heart, to my beloved parents who gave me their mental and financial supports. My words here would not be enough to show my appreciation towards all kind of supports and encouragement they had given me throughout the research.

Not forget to mention, I would like to express my gratitude and appreciation to my supervisor, Professor Dr. Zulkifli bin Idrus, for help, guidance and encouragement that he gave regarding to my topic of research. I would also want to thank staffs of Animal Research Centre and Laboratory of Animal Production, Institute of Tropical Agriculture for providing good facilities and assistance to me during research.

Last but not least, my sincere thanks to my friends who had helped me, directly or indirectly, during the research. They shared their knowledge and guided me from time to time in order to make this research a success.

Thank you.

TABLE OF CONTENTS

CERTIFICATION	i
ACKNOWLEDGEMENT	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	v
LIST OF ABBREVIATIONS	vi
ABSTRACT	vii
ABSTRAK	viii
CHAPTER 1: INTRODUCTION	1
1.1 Significance of Study	2
1.2 Research Hypothesis	2
1.3 Objectives	3
CHAPTER 2: LITERATURE REVIEW	4
2.1 Emulsifier	4
2.2 Unsaturated: Saturated Fatty Acid Ratio	5
2.3 Age	5
CHAPTER 3: MATERIALS AND METHODS	6
3.1 Location of Experiment	6
3.2 Birds and Management	6
3.3 Experimental Diet and Feeding	6
3.4 Traits Measured	8
3.5 Experimental Design	8
3.6 Laboratory Analysis	8
3.6.1 Determination of Crude Fat Digestibility	9
3.6.2 Determination of AME Content	9

3.7 Statistical Analysis	10
CHAPTER 4: RESULTS AND DISCUSSION	11
4.1 Results	11
4.1.1 Growth Performance	11
4.1.2 Crude Fat Digestibility	12
4.1.3 AME Content	13
4.2 Discussion	13
CHAPTER 5: CONCLUSION	17
REFERENCE	18



LIST OF TABLES

Table 1	Standard corn-soybean based starter diet	7
Table 2	Standard corn-soybean based grower diet	7
Table 3	Nutrient composition of standard broiler corn-soybean meal based starter diet	7
Table 4	Nutrient composition of standard broiler corn-soybean meal based starter diet	7
Table 5	Effect of Volamel supplementation on weekly body weight (g/bird)	11
Table 6	Effect of Volamel supplementation on weekly feed intake (g/bird)	11
Table 7	Effect of Volamel supplementation on weekly FCR (feed/gain)	12
Table 8	Effect of Volamel supplementation on crude fat digestibility on day 7 and day 14 (%)	13
Table 9	Effect of Volamel supplementation on AME Content in excreta on day 7 and day 14 (%)	13

LIST OF ABBREVIATIONS

kcal ME/kg	kilocalorie Metabolizable Energy/kilogram
%	Percentage
°C	Celsius
g	Gram
CP	Crude Protein
OC	Olein (Control)
OV	Olein + Volamel
FCR	Feed Conversion Ratio
AME	Apparent metabolizable energy
ANOVA	Analysis of Variance
GLM	General Linear Model

ABSTRACT

Digestion and absorption of fat in young chicks are not efficient because of a low level of natural lipase production. Therefore an experiment was conducted to study the effect of exogenous emulsifier (glycerol polyethylene glycol recinoleate) supplementation on growth performance and nutrient digestibility in broiler chickens. A total of 120 one-day-old male Cobb broilers were assigned in groups of 10 to 12 battery cages. The chicks were randomly assigned to two dietary treatments, with 6 replicate cages per treatment. The diets were either standard broiler starter (2972 kcal ME/kg and 21.002% CP) and standard broiler finisher (3167 kcal ME/kg and 18.068% CP) (OC) or similar diets + 0.05% Volamel (OV). Volamel is a commercial exogenous emulsifier manufactured by Nukamel Inc., Hoogbuul, Olen, Belgium. Weekly body weight, feed intake and feed conversion ratios (FCR) were recorded. Energy and fat digestibilities were determined on day 7 and 14. Diet had no significant effect on body weight, feed intake, and FCR throughout the period of study. Fat digestibility was not affected by diet but birds supplemented with Volamel had lower energy digestibility on both day 7 and 14. The lack of beneficial effects of emulsifier supplementation could be associated with the type of emulsifier used, type of dietary fat and level of free fatty acids found in feed prepared. In conclusion, the results of this experiment showed that supplementation of exogenous emulsifier had no significant effect on both growth performance and nutrient digestibility in broiler chickens. Further studies on the effect on type and level of dietary fat on the action on exogenous emulsifier are necessary for better improvement in the efficiency of broiler chicken production.

ABSTRAK

Pencernaan dan penyerapan lemak yang tidak efisien dalam kalangan anak ayam berlaku disebabkan tahap enzim lipase yang rendah. Satu eksperimen telah dijalankan untuk mengkaji kesan suplemen emulsifier eksogen (glycerol polyethylene glycol ricinoleate) terhadap prestasi pertumbuhan dan penghadaman nutrien dalam anak ayam. Sebanyak 120 ekor anak ayam jantan ayam pedaging Cobb telah dibahagikan kepada 12 kumpulan yang terdiri daripada 10 ekor anak ayam. Dua diet eksperimen diagihkan kepada anak ayam secara rambang, 6 replika bagi setiap diet eksperimen. Diet yang disediakan adalah sama ada starter standard ayam pedaging (2972 kcal ME / kg dan 21,002% CP) dan finisher (3167 kcal ME / kg dan 18.068% CP) (OC), atau diet sama + 0.05% Volamel (OV). Volamel merupakan emulsifier eksogen komersial yang dihasilkan oleh Nukamel Inc., Hoogbuul, Olen, Belgium. Berat badan ayam mingguan, pengambilan makanan dan nisbah penukaran makanan (FCR) telah dicatat. Tenaga dan penghadaman lemak bagi hari ke-7 dan ke-14 telah ditentukan. Diet eksperimen tidak mempunyai kesan yang ketara atas berat badan, pengambilan makanan serta FCR sepanjang tempoh pengajian dijalankan. Diet eksperimen tidak menjejaskan penghadaman lemak tetapi ayam yang makan diet OV menunjukkan tahap penghadaman tenaga yang rendah pada hari ke-7 dan ke-14. Kekurangan kesan yang efektif daripada suplemen emulsifier boleh dikaitkan dengan jenis emulsifier yang digunakan, jenis lemak diet dan tahap asid lemak bebas dalam diet yang disediakan. Kesimpulannya, keputusan eksperimen ini menunjukkan bahawa suplemen emulsifier eksogen tidak mempunyai kesan yang ketara terhadap prestasi pertumbuhan dan penghadaman nutrient

dalam ayam pedaging. Kajian lanjut mengenai kesan jenis lemak dalam diet terhadap tindakan emulsifier eksogen perlu dijalankan untuk penambahbaikan dalam kecekapan produksi ayam pedaging.



CHAPTER 1: INTRODUCTION

Diets for broiler chickens have been reevaluated over years. According to Murugesan (2011), utilization of corn in ethanol production has an impact on both the cost and availability of starch as low-cost energy source, which makes dietary energy a costly component in poultry diets. As an alternative, fats and oils are supplemented to increase the metabolizable energy of the total ration for poultry. It is known that high yielding broiler birds need diets with high nutrient density. High energy feeds are often formulated in order to achieve energy requirements in broiler chickens. Andreotti et al. (2004) has reported that the level of lipid addition to the diets fed may influence broiler chickens' growth, where they observed an improvement in broilers' body weight gain. Generally, diets with lower metabolizable energy (ME) level can result in a depression of growth performance (Cho et al., 2012). Oils and fats provide lower caloric increase as compared to carbohydrates during digestion, which can provide greater amount of energy to meet maintenance and production demands (Polycarpo et al., 2014).

On the other hand, Aguilar et al. (2013) reported that the digestion of lipid is particularly inefficient in young chicks due to their inability to emulsify lipid completely as well as deficiency in the activity of enzyme lipase. Al-Marzooqi and Leeson (1999) observed inefficient digestion and absorption of fat occurred in young chicks due to low level of natural lipase production. Furthermore, the low rate of bile salt synthesis in young chicks may exacerbate the problem (Jackson et al., 1971). Dietary supplementation of bile salts improved fat utilisation in chicks but it was not economical (Al-Marzooqi and Leeson, 1999). Hence, to increase the absorption of animal fat,

an emulsifier can be added to the diet to increase the incorporation of these fatty acids in the micellar phase (Dierick and Decuypere, 2004). This is because emulsifiers may mimic and fortify the effect of the natural bile salts in poultry, and thus improving the absorption and utilization of fat in young birds. Therefore, the objective of the current study is to evaluate the effect of exogenous emulsifier supplementation on growth performance and nutrient digestibility in broiler chickens.

Keywords: Emulsifier, growth performance, nutrient digestibility, broiler chickens

Significance of Study

The findings can help to improve the efficiency of broiler chicken production, especially in fat digestibility and absorption.

Research Hypothesis

Dietary supplementation with emulsifier can improve nutrient digestibility and subsequently the growth performance of broilers.

Objectives

General objective:

To determine the effect of a commercial exogenous emulsifier (Volamel) supplementation during different phases of feeding on growth performance and nutrient digestibility in broiler chickens. Volamel (Nukamel, Belgium) is a oil-in-water soluble nutritional emulsifier.

Specific objectives:

To evaluate the effect of supplementing exogenous emulsifier in the starter and finisher periods on apparent digestibility of fat, apparent metabolisable energy (AME), and growth performance content in broiler chickens.

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