

RESPONSE OF BROILER CHICKENS TO VARYING AMINO ACIDS FEEDING PROGRAMS

By

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ABSTRACT

Saber Sobhy Gadelrab: Response of Broiler Chickens to Varying Amino Acids feeding Programs. Unpublished Ph.D. Thesis, Department of Poultry Production, Faculty of Agriculture, Ain Shams University, 2014.

The present study was carried out to evaluate the effect of Methionine and Lysine supplementation to high or low crude protein corn-soybean diets on Hubbard broiler chicks' growth performance, carcass characteristics and economic evaluation. Two levels of crude protein: (1) High protein (HCP), while were standard to Hubbard broiler chicks requirements, 23, 21 and 19 % CP for starter, grower, and finisher diet, respectively. (2) Low protein (LCP), 21, 19 and 17 % CP for starter, grower, and finisher diet, respectively, were used. High protein diets supplemented with three levels of Methionine (Meth) and Lysine (Lys): 100 (control), 80 and 120 %. Low protein diets supplemented with three levels of Meth and Lys: 100 (as a control), 120 and 140 % to form six experimental diets. These dietary treatments were fed to 360 1-day old unsexed broiler chicks which divided into six dietary treatments of four replicates each.

The results obtained were summarized as follow:

The highest final live body weight and daily weight gain were recorded for chicks received diets contained high or low crude protein with 100 % Meth and Lys addition during the experimental period. The overall experimental period (1 – 35 d day of age), broiler chicks fed on HCP with 100 % Meth and Lys addition had the highest values for daily feed consumption and the worst feed conversion ratio compared to the other experimental treatments.

Overall, Regardless to NFE digestibility the broiler chicks which fed on diets HCP or LCP supplemented by lys and meth

recorded improvement in nutrient digestibility coefficient than HCP with 100 % or 80 % lysine and methionine supplement.

Adding Meth and Lys in broiler diets were insignificantly differences in carcass and total edible parts percentages among all treatments. Gizzard and abdominal pad fat percentages were significantly affected by the different levels of protein and amino acids supplements. There were insignificant effects of supplementing different amino acid (lysine and methionine) and protein programs on total plasma protein, albumin, A/G ratio, uric acid, creatinine and GPT. Plasma globulin was significantly higher in T4, T1 and T6 treatments than T2 treatment (80 % AAs). The treatments T3 and T5 have significantly higher values of total plasma lipid and triglycerides, while, T1, T2 and T4 have the lowest values of these measurements of blood.

Primary and secondary humeral immune responses were recorded the highest values for LCP diet with 100 and 140 % AAs supplements. While the HCP diet with 80 % AAs treatment was the lowest value of primary and secondary immune responses.

Birds fed on LCP diet with 100 % Meth and Lys improved the percent of economic efficiency expressed as % of net return/feed cost, relative economic efficiency and performance index than other experimental treatments.

In conclusion, the results indicated that birds fed on LCP diet with 100 % AAs without adverse effects on productive performance, digestibility traits, carcass characteristics, blood plasma analysis, primary and secondary immune responses and economic evaluation; also, in order to reduce feed cost as well as to lessen N emission in environment..

Keywords: crude protein, methionine, lysine, broiler, growth performance, carcass, blood, economic evaluation.

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LIST OF ABBREVIATIONS

AME	Apparent metabolizable energy
Av. P.	Available phosphorous
BWG	Body Weight Gain
CF	Crude Fiber
Cont.	Control
CP	Crude Protein
DM	Dry Matter
EE	Ether Extract
EEf	Economic efficiency
FCR	Feed Conversion Ratio
FI	Feed Intake
g	gram
GOT	Glutamate-Oxaloacetic Transaminase
GPT	Glutamate-Pyruvic Transaminase
H	High
IBD	infectious bursal disease
IU	International Unit
Kcal	Kilocalorie
Kg	Kilogram
L	low
LBW	Live Body Weight
Lys	lysine
ME	Metabolizable energy
Meth	methionine
mg	Milligram
NFE	Nitrogen Free Extract
NS	Non-significant
OM	Organic Matter
PEF	Production efficiency factor
PI	Performance index

REE	Relative economic efficiency
SBM	Soybean Meal
SRBC	Serum red blood cells
Sig.	Significance
Treat.	Treatment
wk	Week
wks	weeks

1. INTRODUCTION

Feed costs account about 75% of the cost associated with meat production. Therefore, many attempts have been done to decreased the cost of feed and therefore increase the profit. Although many papers have been published to investigate the effects of low crude protein diets on performance and meat yield, only a few papers described the effect of amino acid addition followed by a slight decrease of crude protein diets on broiler performance. Methionine and lysine are the first two limiting amino acids in corn soybean diets for broilers. Synthetic methionine sources and crystalline lysine sources are now commercially available and reasonably priced. The poultry industry has achieved improvements in the performance and yield of broilers by increasing dietary amino acid density. Broiler diets formulated to be high in CP can be expensive and result in inefficient N utilization. The ideal protein or amino acid concept is more accurate than formulating with a CP minimum because it maximizes N utilization by meeting the essential amino acid requirement of broilers while minimizing excesses (**Emmert and Baker 1997**). **Erwan *et al.*, (2011)** who studied that the comparing diets with different protein levels resulted in favorable body composition, especially in a greater fat decrease for high-protein diets, with part of these alterations being attributed to an increase of amino acid. (**Layman *et al.*, 2003** and **Plantenga *et al.*, 2004**). **Sinova *et al.*, (2010)** indicating that young broilers might be more sensitive to changes in diet quality than older broilers. **Shahzad *et al.*, (2011)** noted that the feed conversion ratio of broiler for low CP diet fortified with methionine and lysine was better as compared to the rest of the treatment groups. **Corzo *et al.*, (2005)** found that lysine supplementation significantly improved the live body weight and

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feed conversion efficiency (**NRC, 1994**). According to **Han et al., (1992)** lysine is the most effective factor to produce breast muscles. **Mukhtar et al., (2010)** and **Nasr (2012)** suggest that additional lysine and methionine at 120% and other AA at 110% of **NRC** recommendations in starter and grower diets significantly improved body weight at 42 days of age. **Nasr and Kheiri (2011)** indicated that body weight was significantly highest in birds that received high Lysine starter and grower diets. Also, **Dozier et al., (2008a)** and **Garcia et al., (2006)** have shown that maximal feed efficiency (gain/feed ratio) requires a higher dietary level of lysine than maximal body weight gain. Increasing Lys level in the diet increased breast meat weight, BWG and decreased FCR as reported by other researches (**Kidd et al., 1998; Rezaei et al., 2004 and Dozier et al., 2008**). Optimum level of Lys for 21 - 42-day-old broiler chickens in this experiment was 1% because in this level, lower FCR and highest BWG and other performance parameters were observed and with increasing Lys level from 1 to 1.1% had negative effect on performance **Mukhtar et al., (2010)**. **Elamin and Abbas (2011)** and **Pillai et al., (2006)** who reported that feed intake, weight gain and feed efficiency were significantly maximized with addition of methionine.

The objective of this study was to evaluate the effect of varying amino acids feeding programs and protein on productive performance, digestibility coefficients, carcass characteristics, blood plasma analysis, immunity measurement and economic efficiency on Hubbard broiler chicks.

2. REVIEW OF LITERATURES

2.1. Lysine and methionine amino acids in broiler nutrition.

The main objectives of poultry production are to over consumers' low cost, high quality products and low fat meat. The quality of poultry protein depends on an efficient and well balanced diet of amino acids. Modern fast growing broiler chicks need high levels of protein and amino acids to fulfill growth rate and feed efficiency.

Dietary crude protein (CP) level has shown to have significant effects on carcass composition (**Smith and Pesti, 1998 and Smith *et al.*, 1998**). In general, increasing dietary CP improves feed conversion ratio (FCR), increases breast meat yield and decreases abdominal fat. It is reasonable to assume that dietary feed formulations with higher dietary CP levels above industry standards would prove to be more profitable. Although investigate the effects of a slight decrease of crude protein LCP diets and describe the effect of amino acid supplemented diets to evaluate the effects on broiler performance and meat yield.

Lysine, methionine, are indispensable amino acids and should be included in the diet, they are the first two limiting amino acids in corn soybean formulations for broilers. Synthetic methionine and crystalline lysine are now available and had a reasonable price. The addition of synthetic amino acids allows a decrease in crude protein without affecting the performance of chicks. However, if crude protein levels decreased considerably, caution should be taken so the less limiting amino acids like: isoleucine, valine, arginine, and tryptophan do not decrease to marginal levels; therefore minimum values for these amino acids should be included in the formulated feed to serve as constraint to crude protein. Crude protein will decrease up to these levels and