A COMPARATIVE STUDY ON PRODUCTIVE PERFORMANCE OF SOME BROILER CHICK STRAINS FED DIFFERENT LEVELS OF CRUDE PROTEIN TO METABOLIZABLE ENERGY

BY

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B.Sc. Agric. Co-operative Sc., High Institute for Agric. Co-operation, ١٩٩٧

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Approval Sheet

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ABSTRACT

Osama Abd El-Fatah Abd El-Wahab Ali, A COMPARATIVE STUDY ON PRODUCTIVE PERFORMANCE OF SOME BROILER CHICK STRAINS FED DIFFERENT LEVELS OF CRUDE PROTEIN TO METABOLIZABLE ENERGY, Unpublished Master of Science thesis, Department of Poultry Production, Faculty of Agriculture, Ain Shams University, ٢٠٠٧

An experiment was conducted to study the effect of strain and dietary protein level on productive performance and their yield of carcass parts of broiler chicks. Factorial experiment ٢ x ٣ was used with two dietary protein levels and three commercial broiler chick by birds (Hubbard, Isa- Hubbard and Arbor Acers).The experimental period lasted for ٤٢ days, feeding regime (program) as divided into three stages (starter, grower and finisher).

The results indicated that, the final body weight was affected by strain which recorded ١٥٢٦g/bird for Hubbard, ١٥١٧g/bird for Isa-Hubbard and١٤٤٢g/bird for Arbor Acers. Body weight of chicks at low protein ١٥٠٢g/bied was slightly higher than those of high protein ١٤٨٨g/bird. The differences in feed consumption were significant (P<٠,٠٥) at the final stage of growth. Hubbard broiler chicks fed high protein level recorded the best feed conversion ratios values at the three stages of growth (١,٦٧, ١. ٩٣and ١,٩٩ for starter, grower and finisher respectively) compared with the other two strains that at high protein level. There are no clear differences in percentage of breast weight; thigh or drumstick due to variation in strain, sex or dietary protein. Edible organs of chicks did not affected by strain or dietary protein level.

The result indicated that the broiler fed on high protein diets was higher in economic efficiency compared with the broiler fed on low protein diet.

Key Words: Broiler, Strains, Protein levels, Performance, Carcass, Blood Trait, Economical Efficiency.

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١. INTRODUCTION

Diet composition is considered the major factor affecting profitability of broiler production, because the production performance of broiler is highly controlled by dietary composition. Also the feeding cost depends upon the composition and nutrient density of the diets.

In Egypt, the observations drown from broiler chicks farms showed that, similar diet contents of protein and energy have been received for broiler chicks. However the growth response of broilers to the diet composition is vary according to the strain and sex. **Le Clereq (١٩٨٣)** and **Smith and Pesti (١٩٩٨)** observed significant interaction between strains and dietary protein levels to induce body weight gain of broilers. **Veerapen and Driver (١٩٩٩)** reported that, body weight gain of males (Ross strain) was higher than that of females at the same age. As well as, the yield of carcass parts are differing according to sex, strain and diet composition.

Rondellin *et al.,* **(٢٠٠٣)** and **Sterling** *et al*., **(٢٠٠٦)** found a difference in carcass yield, breast and breast fillet due to different strains or genotype. **Salmon** *et al.,* **(١٩٨٣)** reported that differences in protein levels of starter diet had a higher effect on breast muscle yield than the differences in dietary protein level of finisher diet.

Dietary protein level, or energy to protein (E:P) ratio, beside its determinant effect on weight gain and feed efficiency of broiler ckicks, has a marked effect on the quality of their carcasses, viz., yields of edible meat, and fat content **Bartov and Plavnik, (١٩٩٨)**. Diets lower in protein than recommended **(NRC, ١٩٩٤)** reduced the yields of meat and increased fattening **Moran** *et al.,* **(١٩٩٢).**

The latter approach can reduce performance when the nutrient content of the diets becomes inadequate and the farmer can substantially increase the total cost of the feed. However, increasing the dietary crude

protein (CP) level often improves feed efficiency even in the absence of a growth response **Jackson** *et al.,* **(١٩٨٢b)**.

High-energy broiler starter diets could result in extra deposition of fat **Holsheimer and Veerkamp, (١٩٩٢)**. This extra fat is not appreciated by the consumer. When it is removed from the carcasses in the slaughter house it is sold for a low market price **Holsheimer and Ruesink, (١٩٩٢)**.

Decreasing the dietary energy to protein ratio will also increase meat yield and decrease carcass fat content **Salmon** *et al.,* **(١٩٨٣)**.

Feed represents the major cost (between ٦٠-٧٠٪) of producing poultry meat and eggs **Leeson and Summers, (١٩٩٧)**; and **Sainsbuty, (٢٠٠٠)**, thus much effort has been directed at reducing feed costs and increasing the feed conversion efficiency in which birds convert food into eggs and meet. Moreover, allowing birds an unlimited supply of food result in consumption in excess of the bird requirement for maintenance and in excess energy being converted into fat. This fact is of economical importance because fat adversely affect reproductive performance **Mench, (٢٠٠٢).**

In recent years, wide fluctuations in ingredient costs have led to greater emphasis on factors other than bird performance per se when considering the economics of broiler production **Jackson** *et al.,* **(١٩٨٢b).**

Less expensive protein sources have been utilized effectively to increase the CP level of the diets for reducing abdominal fat deposition **Cabel** *et al.,* **(١٩٨٨).**

The present study aimed to investigate the effect of strain and dietary protein levels on performance of broilers, yield of carcass parts, some blood traits, immunity organs and the economical efficiency.

٢. REVIEW OF LITERATURE

٢٫١. The effect of dietary protein levels on broiler performance and carcass yields:

٢٫١٫١. Body weight gain:

In crease dietary protein levels have appositive effect on body weight gain of broiler checks. That has been reported in the most previous review. However some research workers especially those taking the economic efficiency in their consideration recommended by using the lower level of protein in broiler diets.

Twining and Bossard (١٩٧٥) indicated that, feeding broiler chicks on high protein diet (٢١,٥٪) resulted in a significantly higher body weight compared with low protein diet (١٧,٠٪).

Babetunde *et al.*, **(١٩٧٦)** showed that body weight gain of broiler chicks fed ٢٤٪ dietary protein level was significantly more than those fed a lower level of protein. They recommended by a level of ٢٤ and ١٨٪ dietary protein level in starter and finisher period respectively.

Moran (١٩٧٩a) noted a reduction in body weight gain as a result of decrease dietary protein level from ٢٤٪ to ٢٢٪.

Moran (١٩٧٩b) reported that body weight gain was not affected by reducing dietary protein level from ٢٦ to ٢٤٪ while the ration of ٢٧٪ protein negatively affected body gain.

Treindad *et al.*, **(١٩٨٠)** found that body weight gain was higher by ٤,٥٪ in chicken fed diets containing ٢٠٪ crude protein compared with those fed ١٦ or ١٨٪ dietary protein levels.

Hulan and Proudfoot (١٩٨١) observed that a dramatically reduction in body weight gain of chicks due to decrease dietary protein level from ٢٤٪ to ١٦٪ in starter diet.

El Moghazy *et al.,* **(١٩٨٢)** observed a linear in body weight gain due to gradually elevating of dietary protein level from ١٨ to ٢٤٪.

Jackson *et al.,* **(١٩٨٢a)** reported that body weight gain increased with increasing dietary protein levels. They fed broiler chicks in a diets varying in crude protein levels ١٦, ٢٠, ٢٤, ٣٢.

Pesti and Fletcher (١٩٨٣) noticed that increasing dietary protein level from ١٧ to ٢١٪ significantly increased body weight gain of male broiler chickens during the growing and finishing phase of production.

Pesti and Fletcher (١٩٨٤) demonstrated that, increasing dietary protein level from ١٧,٥ to ٢٢٪ with the constant level of M.E at finisher period (٢١ to ٤٢ day of age), increased body weight gain.

Diambra and McCartney (١٩٨٥) fed broiler chicks at the finisher phase (٤٢ to ٤٩ day of age) different dietary protein levels ٩, ١٢, ١٥ and ١٨٪ with the constant level of energy. They reported that body weight gain was improved by increasing dietary protein level.

Summers and Leeson (١٩٨٥) observed that CP level in finishing diet had a little influence on male broiler body weight gain except that chicks fed on ١٨٪ CP diet recorded significantly more weight gain during this period than those receiving ٢٢٪ CP diet.

Omer and Musharafa (١٩٨٧) compared standard NRC dietary protein recommendations for broiler diets to allow protein diet (A) ١٨,٨ or ١٧,٩٪ and a high protein diet (B) ٢٤ or ٢٣٪ in the starter and finisher periods, respectively. They showed no difference in performance between NRC diet and diet (A), while both were significantly lower than diet (B).

Fancher and Jensen (١٩٨٩a) found that decreasing the dietary protein level from ١٨,٣ to١٥,٩٪ significantly decreased body weight gain.

Fancher and Jensen (١٩٨٩b) and **Pinchasov** *et al.*, **(١٩٩٠)** reported that lower body weight gains were occurred with lower of dietary CP.

Khajarern *et al.*, **(١٩٨٩)** they fed broilers on diet differed in crude protein CP level in starter (٠-٤ weeks) and finisher (٤-٧ weeks) phases as follow: ٢٢-١٩, ٢٢-١٨, ٢٢-١٧, ٢١-١٩, ٢١-١٨, ٢١-١٧, ٢٠-١٨ and ٢٠-١٧٪. The results of this experiment indicated that the respectively optimal dietary protein level for starter and finisher was ٢١-١٧٪. Lowering protein level in the diet did not affect chick growth.

Cabel and Waldroup (١٩٩١) fed broiler diet containing ٢٣٪ CP at starter then given diet containing ١٥٪ CP in the finisher, there were no significant differences in final body weight when compared with those fed diet containing ١٨, ٢٠, and ٢٣٪ CP, they also found that the protein and amino acid requirement were decreased with increasing age, which explain why CP level affected of performance less during the finishing period.

Holsheimer and Veerkamp (١٩٩٢) used two CP levels of (٢٣,١, ٣٣,٦٪),(٢١,٠, ٢٩,٧) with ٣٢٠٠ and ٢٨٨٠ k cal. ME / kg diet, the diets were given until ٨ weeks of age. They found that the normal CP diets gave significantly higher gains (P<٠,٠٥) than the high CP diets at ٦, ٧, and ٨ weeks of age.

Deschepper and Groote (١٩٩٠) showed that it is possible to obtain the same performances with low protein diets supplemented with synthetic amino, using an ideal amino acid balance, however. **Gongnet** *et al.*, **(١٩٩٠)** found that growth was significantly better with ٢٠ than ١٤٪ dietary CP, from ٣-٦ weeks, receptively.

Jacob *et al.,* **(١٩٩٥)** reported that, broiler chicks fed ١٧٪ protein diet from ٣ to ٦ weeks of age showed insignificant differences in final body weight when compared to ٢٠,٥٪ protein level.

Agnihotri and Paghel (١٩٩٦) recorded that chicks fed ٢٤٪ dietary protein level performance more body weight gain than those fed ١٨٪ CP.

Ferguson *et al.,* **(١٩٩٨)** showed that feeding low protein diets to broilers decrease growth performance.

Ehab and Atta (٢٠٠١) used two levels of protein in starter diets which formulated to contain ٢٣٪ & ٢٠٪ CP; finisher diets contain ٢٠٪ & ١٧٪ CP. He recommended to feed chicks diet containing ٢٠٪ CP to ٢٨ day followed by diet containing ١٧٪ CP to ٤٩ day of age.

Sterling *et al.,* **(٢٠٠٣)** fed broiler chicks three dietary CP levels (١٧, ٢٠, and ٢٣٪) they reported that dietary CP levels had significant ($p<٠,٠٠١$) effects on body weight gain (BWG).

Sterling *et al.,* **(٢٠٠٥)** they showed a significant linear and quadratic effects of dietary CP intake on body weight gain (BWG) when fed the broiler on (١٧, ٢٠, ٢٣, and ٢٦٪) CP in a diet containing (٣٢٠٠ kcal/ kg ME).

Tabeidian *et al.,* **(٢٠٠٥)** they study the effect of dietary protein levels and soybean oil supplementation on broiler performance they feed the broilers crude protein levels were **NRC(١٩٩٤)** recommendation and ١٠٪ more than NRC recommendation (NRC x ١٠) they demonstrated that increasing diet protein up to ١٠٪ more than NRC recommendation could not improve body weight gain in broiler chickens except for ٧-٢١d old chicks that fed a diet containing no soybean oil and high protein level that resulted to highest weight gain.

Matterson *et al.,* **(١٩٥٥)** reported that the productive energy to protein ratio decreased from ٥١ to ٣١ in isocaloric rations containing ٢٠-٢٨٪ protein, growth rate appeared to increase.

Preze *et al.,* **(١٩٦٨)** found that the level of ٢٢٪ CP or more gave a better growth.

Lipstein *et al.,* **(١٩٧٥)** observed that no significant difference in body weight gains rates in female broilers from ٣٦ to ٦٣ days fed a ١٥,٥٪ CP diet supplemented with additional methionine and lysine in comparison with controls receiving an ١٨,١٪ CP diet. Male a ١٥,٥٪ CP diet supplemented with additional methionine and lysine exhibited weight gains values equal to those fed a ٢٠,٢٪ CP diet from ٣٥ to ٦٢ days of age.

Babetunde *et al.,* **(١٩٧٦)** showed that body weight gain for broiler chicks with ٢٤٪ protein was significantly more than with any protein level. They recommended that cured protein level not less than ٢٤٪ and ١٨٪ respectively, for broiler starter and finisher diets.

Twining *et al.,* **(١٩٧٨)** reported that birds reared for ٥٩ days and fed low protein diets had lower body weight than those fed high protein diets.

Hargis and Creger (١٩٨٠) observed that high dietary protein levels were detrimental to growth during the starting period (٠-١٤ days), but beneficial in maximizing gain and feed efficiency during the finishing period (٢٨ to ٤٩days).

Hulan *et al.,* **(١٩٨٠)** demonstrated that as the protein content of starters, growers, and finishers decreased, body weight decreased.

Moran (١٩٨٠) fed broiler chicks on (٢٤, ٢٦, and ٢٢٪, respectively) and (٣١٠٠ kcal ME/kg) during the first ٢ weeks