GENETIC DIFFERENCES FOR PERFORMANCE OF SOME BROILER STRAINS FED ON NATURAL GROWTH PROMOTERS

By

TAMER MOHAMED BADR EL-DIN MOSTAFA

B.Sc. Agric. Sc. (Poultry Production), Ain Shams University, 1996

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This thesis for M. Sc. degree has been approved by:

Dr. Amira Esmail El-Dlebshany **…..……..……**

Prof. of Poultry Breeding, Faculty of Agriculture, Alexandria University.

Dr. Ali Zein El-Dein Hassan Farag **…..……..……**

Prof. Emeritus of Poultry Breeding, Faculty of Agriculture, Ain Shams University.

Dr. Salah El-Dein Abdel-Rahman El-Safty **…..……..……**

Prof. of Poultry Breeding, Faculty of Agriculture, Ain Shams University**.**

Dr. Ahmed Hatem Ibrahim El-Attar **…..……..……**

Prof. Emeritus of Poultry Breeding, Faculty of Agriculture, Ain Shams University**.**

Date of Examination: 6 / 3 / 2017

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TAMER MOHAMED BADR EL-DIN MOSTAFA

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Under the supervision of:

Dr. Ahmed Hatem Ibrahim El-Attar

Prof. Emeritus of Poultry Breeding, Department of Poultry Production, Faculty of Agriculture, Ain Shams University (Principal supervisor)

Dr. Salah El-Dein Abdel-Rahman El-Safty

Prof. of Poultry Breeding, Department of Poultry Production, Faculty of Agriculture, Ain Shams University

Dr. Hany Ali Thabet Motawea

Lecturer of Poultry Nutrition, Department of Poultry Production, Faculty of Agriculture, Ain Shams University

ABSTRACT

Tamer Mohamed Badr El-Dien Mostafa: Genetic Differences For Performance of some Broiler Strains Fed on Natural Growth Promoters. Unpublished M.Sc. Thesis, Department of Poultry Production, Faculty of Agriculture, Ain Shams University, 2017.

An experiment carried out and aimed to investigate the genetic differences in productive performance, some plasma constituents, carcass characteristics, microbial population and histological examination of small intestine of two broilers strains fed natural feed additives.

One hundred and twenty six unsexed 1 day – old of Hubbard were obtained from a commercial hatchery, randomly distributed into 7 treatments and one hundred and twenty six unsexed 1 day – old of Ross broiler chicks were obtained from a commercial hatchery, randomly distributed into 7 treatments. Each treatment comprised of 18 chicks which divided into 3 replicates of 6 chicks each.

Results of this experiment showed that feed additive enhance live body weight and body weight gain compared with control diet with significant differences. Also, there was a significant difference between strains in dressing percentage, where the dressing percentage of Ross was greater than Hubbard.

There was a significant reduction in both triglycerides and cholesterol due to inclusion of probiotic or prebiotic.

In addition , prebiotic or probiotic enhance villi morphology conditions by increasing villus height which cause an increase in absorption surface area and lead to increase nutrients digestibility.

Finally, it could be concluded that, we can use either of Bio-Mos or Enhancer in order to enhance broiler performance as well as broiler health.

Key Words: Broiler– Strain - Productive performance – Probiotics - Prebiotics.

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

In Egypt, broiler meat production take significant place in covering Egypt protein source due to a highly cost of substitute sources (e.g. cattle and fish).

Genetic improvements of broiler strains rise rapidly, and frequently, many strains were selected and located as developed strains for high performance.

Besides quality attributes, special attention in recent years has been paid by the consumers to safety of animal products. Considering some evidence that the use of antibiotic growth promoters (AGP) may cause pathogen resistance (**Phillips *et al*., 2004**) and antibiotic residues in poultry tissues, the application of antibiotics as animal growth enhancers had already been prohibited in the European Union since 2006. Today's poultry industry have been greatly intensified with respect to both large number of birds and modern feeding systems.

Concerns about the losses in poultry performance and thus sustainability of production and its profitability coupled with this ban have led to an increase in research on the alternative supplements to AGP and strategies for food-producing animals.

Nowadays, a number of products, including essential oils and plant extracts, spices, organic acids, probiotics and prebiotics have been recognized and proposed as antibiotic alternatives in poultry nutrition. Although most of them have generated attention, extensive studies are primarily focused on prebiotics and probiotics. Probiotic

means "for/in favour of life". This term was introduced into the literature by **Lilly and Stillwell (1965**). It contrasts with the term antibiotic, which means "killing life".

INTRODUCTION

Today, the most accepted definition states that probiotics are mono or mixed cultures of live microorganisms which, when administered in adequate amounts, confer a health benefit on the host (**FAO/WHO, 2002**). Unlike probiotics, prebiotics are not microorganisms – they are a sort of nourishment source for existing flora, allowing the natural colony of gut to grow naturally and replicate. Prebiotics were defined as non-digestible food (feed) ingredients that beneficially affect the host by selectively stimulating the growth and/or activities of one or a limited number of bacteria in the gut, thereby improving host health (**Gibson and Roberfroid, 1995**).

The objective of the present study was to investigate the genetic differences for performance, carcass characteristics, some blood constituents, Ileum morphological parameters as well as intestinal micro-flora of two commercial broiler strains fed both probiotics and prebiotics.

REVIEW OF LITERATURES

It is known that chickens are the most common food producing species worldwide and their numbers are still increasing. The quantity of broilers produced for meat each year is vast. In 2013, there were more than 60 billion meat type chickens slaughtered in the world **(FAOSTAT, 2015)**. Breeding has drastically improved the efficiency of production traits in broilers, such as FCR and weight gain. It is the high heritability of these production traits that has enabled the development of the production **(Nicol, 2015).** Commercial breeding of broilers started at the 20th century resulting in a quadrupled growth rate. The increase in growth rate can be linked to high mortality rates and diseases along with inactivity, due to imbalanced bodies with large breast muscles **(Muir and Aggrey, 2003, Weeks *et al.*, 2000, Bessei, 2006, and Shim *et al.*, 2012).** Beside breeding and genetics, nutritional and management improvements also have enabled the increased growth rate (**Cooper and Wrathall, 2010**).

In 51 years, between 1956 and 2007, the average weight gain increased from 21 to 63 g/ day, enabling a live weight of about 2.2 kg in 35 days (at slaughter age) (**Aviagen, 2014a, Aviagen, 2014b)**.

2.1. Genetic differences in broiler performance:

2.1.1 Body weight and body weight gain

Genetic crossing led to significant improvements in performance. Body weight gain increased significantly together with feed intake while feed efficiency was reduced significantly as well. Different authors have compared old strains with modern ones in order to establish the improvement obtained through genetic selection. **Sherwood (1977)** compared a random bred strain, the Athens-Canadian Random bred Control (ACRBC) with a modern line from 1976. At the same time, for the purposes of establishing if the progress obtained was due to genetics or to a nutritionally improved diet, two diets were used, a diet from 1953

and a diet from 1976. A 225% increase in growth rate was observed when the two strains were compared. Ninety percent of this increment was calculated to be due to genetics. **Chambers *et al*. (1981)** conducted a similar experiment but with a diet representative of 1978. The authors used as a control the Ottawa Meat Control strain and compared it with two commercial strains. The results showed an increment of 230% in carcass weight. In the same line of experiments, in 1991, **Havenstein** started a series of experiments (**Havenstein *et al*., 1994a; Havenstein *et al*., 1994b)** that would conclude in 2001 (**Havenstein *et al*., 2003a; Havenstein *et al*., 2003b)** comparing the Athens-Canadian Random bred Control (ACRBC) strain to commercial broilers of those years using diets representative of 1957 and 1991 (in the first two experiments) and 2001 (in the last two). In 1991, the results showed that the modern Arbor Acres male was 3.92 times heavier than the ACRBC male at 56 days of age. Over 90% of this difference was due to genetics.

Ahasn ul Haq *et al*. (2003) reported that there was a genetic difference among strains in weight gain trait. Where, maximum weight gain was in Hubbard (1666g.) followed by Arbor Acre (1385g.) and Star bro (1295g.) strains, respectively. There was no significant difference in weight gain between Arbor Acre and Star bro however, Hubbard had significantly more weight gain.

Rahimi et al. (2006) studied the growth performance of six commercial broiler hybrids and found that among the hybrids the greatest daily body weight gain (BWG) was achieved by Cobb broilers, followed by Hubbard, Arian, Ross and Arbor Acres broilers in grower period ($P<0.01$), while Lohmann broilers showed the lowest daily BWG. The highest final weight was achieved by Hubbard broilers, numerically higher than those of Cobb and Arbor Acres ($P>0.01$) which were similar to each other. Arian and Ross showed the same final BW numerically lower than those of Cobb and Arbor Acres, but Lohmann had the lowest BW among the hybrids.