

EFFECT OF PROBIOTIC AND HUMIC ACID ADDITION ON PHYSIOLOGY AND IMMUNITY TRAITS OF BROILER CHICKS

Ali J. Hammod, Aqeel Y. Alshukri and Ammar H. Areaaer

Department of Animal Resources, College of Agriculture, University of Kufa, Iraq
e-mail : alij.alhemaidawi@uokufa.edu.iq

(11 October 2018, Revised 17 December 2018, Accepted 6 January 2019)

ABSTRACT: The current study aimed to investigate the possible effects of probiotic (BioSB-Gold) addition and humic acid both alone or together to broiler diets and determine the effects on physiological traits and immunity in broiler chicks. 120 one day of age and unsexed chicks (class Ross) were used with average weight of 47.7 gm/ chick. The chicks were reared in closed enclosure divided of pens (3m²/pen) and chicks distributed randomly inside pens. Four treatments were used: T1 (standard diet), T2 (standard diet with 1gm probiotic/ kg feed), T3 (standard diet with 1gm humic acid/ kg feed) and T4 (standard diet with 1gm of probiotic and 1 gm of humic acid/ kg feed). 30 chicks were (3 replicates) were used for each treatment and experiment continue to 5th week of age. Results showed no significant differences in hemoglobin and the level of directed antibodies against Newcastle and Gamboro diseases while a significant enhancement in the chicks that fed on diets with probiotic and humic acid both alone or together in PCV, WBC and RBC.

Key words : Probiotic, humic acid, broiler chicks.

INTRODUCTION

Poultry industry is one of the main sources in the economy for many countries around the world because of the fast equity capital cycle and its provide the consumers with food. Last decades, many problems faced the world resulted from the increase of population which lead to food deficiency, therefore, the world began to took a big importance of poultry industry to replenish of food. Many factors encourage the poultry breeders to develop this industry such as high growth rate, increase of feed conversion, short of production cycle and the small or limit area which needed for breeding. Probiotic is a useful microbial culture which contain one or more species of microbiology and effect positively on body health and enhance the production performance for domestic animals (Al-Kazaz, 2007). The microbiology behave as a probiotic and covered the epithelial cells receptors in the intestine canal and prevent the pathogens bacteria to make attachment with this cells and expelled it outside body. In addition, the microbiology are contribute of microbial balance of microflora when the birds exposure to stress factors such as high temperature of environment or diseases infection (Zinedine *et al*, 2005). The probiotic is play a crucial role for increasing the resistance against the disease in birds in addition to enhance the production performance (Mountzouris *et al*, 2007). It's also

contribute of balance the intestinal environment and help the vitamins manufacturing (Fuller, 1989). The probiotic can help for improving the meat quality and its safe products on human health compared with antibiotic (Dibner and Buttin, 2002). In last years, importance increased with nature growth tonics such as organic acids (Vogt *et al*, 1982) because its play important role in improving the production of poultry through the inhibition of harmful intestinal bacteria which reflex positively on birds health (Thompson and Hinton, 1997). One of these organic acids is humic acid which can be characterized as complex acid formed from organic materials analysis and charcoal (Alhameed and Jaloob, 2016). This acid contain of carboxy and aromatic active groups (MacCarthy, 2001) and act as an inhibitor factors against pathogens such as fungi and bacteria and make a thin layer on the mucus membrane of the epithelial cells to protect the digestive channel from diseases (Kühnert *et al*, 1991; Chen *et al*, 2002). The major aim of the current study is to determine the effect of probiotic and humic acid both alone and together on some of physiological and immunity traits in broiler chicks.

MATERIALS AND METHODS

The farm experiment was conducted in poultry farm belonging to University of Kufa, College of Agriculture during the period of 1-10-2016 to 5-11-2016 to determine

the effect of probiotic and humic acid on traits that studded.

Feeding

Chicks were fed on starter ration for three weeks of age followed by finisher ration until the 5th week of age and the treatments were: T1 (standard diet), T2 (standard diet with 1gm probiotic/ kg feed), T3 (standard diet with 1gm humic acid/ kg feed) and T4 (standard diet with 1gm of probiotic and 1 gm of humic acid/ kg feed) while a basal diet was used according table 1.

Management

120 chicks (class Ross) at 1st day of age and unsexed with 47.7 gm of average weight were used and reared in closed enclosure divided of pens (3m²/pen) and chicks distributed randomly inside pens. All the necessary equipments were found to achieve the optimal temperature

Table 1 : Percentage inclusion and calculated composition of starter and finisher diets for broiler.

| Ingredients | Finisher diet | Starter diet |
|------------------------|---------------|--------------|
| Corn | 60 | 60 |
| Soybean meal (44% CP) | 26 | 35.5 |
| Oil sunflower | 1.5 | 1 |
| Premix ¹ | 2.5 | 2.5 |
| Limestone | 0.7 | 0.7 |
| Salt | 0.3 | 0.3 |
| Total | 100 | 100 |
| Calculated composition | | |
| ME(kcal/kg) | 3096 | 2982 |
| CP(%) | 19.05 | 22.44 |
| CP/ ME | 162.5 | 132.9 |

(1) Use of Premix Jordanian Origin Type Provimi 3110 Contains: 2750 kcal/ kg Representative energy, 10% raw protein, 1.1% fat, 21% calcium, 11.0% phosphorus, 6.5% methionine, 6.5% methionine+Lysine, 4.8% Sodium, 5.4% Chloride, 575000 IU Vitamin A, 201250 IU Vitamin D3, 1380 mg Vitamin E, 138 mg Vitamin K3, 138 mg Vitamin B1, 345 mg Vitamin B, 1840 mg Vitamin B3, 552 mg Vitamin 5 B, 184 mg B vitamins, 46 mg vitamin B9, 1000 micrograms B12, 6900 micrograms peyutin, 14,000 mg choline chloride, 460 mg copper, 2760 mg iron, 3680 mg manganese, 3680 mg zinc, 50 mg iodine, 9.2 mg selenium, 30000 m Vitez mine, 250 mg antioxidants, 250 mg lincomycin, 2400 mg selenomycin) / kg.

Table 3 : Probiotic and Humic acid Effects on Haematological indices of broiler during 5th week.

| Treatments | Packed cell volume % | Hemoglobin (g.dl ⁻¹) | RBC (×10 ⁶ / mm ²) | WBC (×10 ³ /μL) |
|---|----------------------|----------------------------------|---|----------------------------|
| G1: Control group | 26.3±0.33b | 10.41±0.46 | 1.55±0.29b | 8.28±0.22b |
| G2: Plus 1gm probiotic | 27.0±0.57b | 10.33±0.33 | 2.09±0.02a | 8.40±0.15ab |
| G3: Plus 1ml humic acid | 28.0±0.57ab | 10.13±0.20 | 1.98±0.03ab | 8.50±0.17ab |
| G4: Plus 1ml probiotic and 1ml humic acid | 29.0±0.57a | 12.16±1.20 | 2.36±0.11a | 9.60±0.66a |

during the rearing period and sawdust (7 cm of thickness) while water and feed were supplemented *Ad-libitum*.

Variables studied

Live body weight, weight gain, feed intake, feed conversion and economic figure were studded. Blood samples were withdrawn in the end of experiment from 4 birds (2 males and 2 females from each treatment from wing vein). The samples were divided in to two parts, 1st part was put in test tubes with anti coagulant (K-EDTA) for hemoglobin test (Varley *et al*, 1980) and PCV test according to Archer (1965). While blood cells determined by using glass slides for differential count according to Natt and Herrick (1952). The 2nd part of blood sample was put in test tubes not contained of anticoagulant to isolate the blood serum and test the level of antibodies against Newcastle and Gumboro diseases by measuring the volume parameter with Enzyme Linked Immune Sorbent Assay (ELISA) in the veterinary hospital located in Al-Najaf province.

Statistical analysis

Data were analyzed by SAS (2012) computer program according to complete randomizes design (CRD) while significance of means differences was tested by Duncan multiple range test (Duncan, 1955).

RESULTS

ELISA test : Results represented in Table 2 showed that the use of probiotic and humic acid in broiler diets did not effected significantly on the level of antibodies against Newcastle and Gumboro diseases in all treatments that studded.

Table 2 : Probiotic and Humic acid Effects on level of antibody titers against Newcastle disease virus (NDV) and infectious bursal disease (IBD) of broiler during 5th week.

| Treatments | Antibody titers against NDV | Antibody titers against IBD |
|---|-----------------------------|-----------------------------|
| G1: Control group | 3036±298 | 3019±267 |
| G2: Plus 1gm probiotic | 1999±349 | 3172±396 |
| G3: Plus 1ml humic acid | 2355±550 | 3178±245 |
| G4: Plus 1ml probiotic and 1ml humic acid | 2656±375 | 3068±297 |

Blood cellular traits: Results in Table 3 showed that the chicks were fed on T4 higher than the other groups in PCV, hemoglobin, RBC and WBC at 35 day of age while the chicks that fed on standard diet were the least value in the traits above. Hemoglobin rate did not affected significantly by probiotic and humic acid addition.

Discussion: through the results of current study we can see no significant differences in antibodies that directed against Newcastle and Gumboro diseases although a theoretical differences towards the treatments that contain probiotic and humic acid both alone or together. Cellular blood traits were enhanced significantly or theoretically in the humic acid or probiotic treatments because the addition of the humic acid as an organic acid or probiotic to broiler diets lead to enhance the health of chicks and its positive effects for inhibition the pathogens microbiology inside the digestive system, the results are similar with those of Thompson and Hinton, (1997). The results also partially agreed with the results of Najiet al, (2011) who reported that the probiotic help for removing the damaging microbiology which may be found inside the digestive channel.

Due to the results of this study, we can conclude that the humic acid and probiotic did not enhance significantly the level of antibodies against broiler diseases such as Newcastle or Gumborowhileits enhance the blood traits therefore, we can exploit this materials to improve the physiological and production performance of broiler chicks.

REFERENCES

- Alhameed S A M and Jaloob M F (2016) Effect of the addition of Humic acid and L-carnitine to the diet on broiler performance. *Iraqi Poultry Sciences J.* **10**(1), 24-36.
- Al-Kazaz, M F A R (2007) A comparison study of the effect of two kinds of probiotic and mixture of them on productive performance of laying hens and semen characteristics of rooster. *M.Sc. thesis*, College of Agriculture, University of Baghdad.
- Archer R K (1972) *Comparative Clinical Haematology*. Oxford Blackwell Scientific Publications.
- Chen C H, Liu J J, Lu F J, Yang M L, Lee Y and Huang T S (2002) The effect of humic acid on the adhesibility of neutrophils. *Thromb. Res.* **108**, 67-76.
- Dibner J J and Buttin P (2002) Use of organic acids as a model to study the impact of gut microflora on nutrition and metabolism. *J. Appl. Poult. Res.* **11** 453-463.
- Duncan B D (1955) Multiple range and multiple F tests. *Biometrics* **11**, 1-42.
- Fuller R (1989) Probiotics in man and animal. *J. Appl. Bacteriol.* **66**, 365-373.
- Kühnert V M, Bartels K P, Kroll S and Lange N (1991) Huminsäurehaltige Tierarzneimitteln Therapie a n d Prophyl axebeigastrointestinalen Erkrankungen von Hund und Katze. *Monatshefte Vet. Med.* **46**, 4-8.
- Mac Carthy P (2001) The principle of humic substances. *Soil Sci.* **166**, 738-751.
- Mountzouris K C, Tsirtsikos P, Kalamara E, Nitsch S, Schatzmayr G and Fegeros K (2007) Evaluation of the Efficacy of a Probiotic Containing *Lactobacillus*, *Bifidobacterium*, *Enterococcus* and *Pediococcus* Strains in Promoting Broiler Performance and Modulating Cecal Microflora Composition and Metabolic Activities. *Poult. Sci.* **86**, 309-317.
- Naji S, AH, Zankana B, Al-Kaissi G A M, Al-Qazaz M and Al-Janabie H (2011) *Probiotic in animal farms*. College of Agriculture, University of Baghdad. First Edition.
- Natt M P and Herrick C A (1952) A new blood diluent for counting the erythrocytes and leucocytes of the chicken. *Poult. Sci.* **31**, 735-738.
- SAS (2010) SAS/STAT User's Guide for Personal Computers. Release 7.0 SAS Institute Inc., Cary, N. C., USA.
- Thompson J L and Hinton M (1997) Antibacterial activity of formic and propionic acids in the diet of hens on salmonellas in the crop. *Bri. Poult. Sci.* **38**, 59-65.
- Varley H, Gowenlock A H and Bell M (1980) *Practical Clinical Biochemistry*. 5th ed. William Heinemann Medical Books Ltd., London.
- Vogt H, Matthes S and Harnisch S (1982) Der Einfluss organischer Säuren auf die Leistungen von Broilern 2 Mitteilung. *Archiv für Geflügelkunde*, **46**, 223-227.
- Zinedine A, Faid M and Benlemlith M (2005) *In vitro* reduction of aflatoxin B1 by strains of Lactic acid bacteria isolated from moroccan sourdough bread. *Int. J. Agri. Biol.* **7**, 67-70.