

Effects of Probiotic and Antibiotic Supplementation on some Blood Parameters in Collared Dove (*Streptopelia decaocto*)

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ABSTRACT

This study is conducted to determine the normal blood parameter values in bird of Collared Dove (*Streptopelia decaocto*) and the effect of probiotic (Chunchine.Geyao[®]:China) and antibiotic (Tilmicosin phosphate-Tilmivap[®]:Jordan) on body weight, hematology and biochemical values in these birds. Forty apparently healthy adults of both sexes Collared dove were selected randomly and assigned into four equal groups (n=10) as A, B, C and D groups. Group A was considered as control group fed on a balanced ration, group B fed with the addition of 1.5 gm probiotic/liter drinking water, group C fed with 0.3ml antibiotic/liter drinking water and group D were fed with 1.5gm probiotic and 0.3 ml antibiotic/liter drinking water respectively during the 35 day of experimental period. The results showed that there is no significant differences in the heterophil, lymphocyte, heterophil/lymphocyte ratio, total serum cholesterol, ALT and in different treated groups. The present findings suggest that supplementation of Probiotic has significant effects on some hematology and biochemical parameters of Collared Dove (*Streptopelia decaocto*) compared to antibiotic supplementation.

Keywords: Probiotic, tilmicosin, body weight, hematology and biochemical parameters, Collared Dove (*Streptopelia decaocto*).

Collared

(Chunchine.Geyao[®]:China)

Dove (*Streptopelia decaocto*)

(tilmicosin phosphate-Tilmivap[®]:Jordan)

(4)

(40)

.(/ 10)

(/ 1.5)

(/ 0.3)

(35)

(/ 0.3)

(/ 1.5)

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INTRODUCTION

Although the Collared Dove is normally assigned its own systematic name, as (*Streptopelia decaocto*), (Allouse, 1962), considerable doubt exists as to its appropriate classification. It is one of the great colonizers of the avian world, (David *et al.*, 2001). Its original range was warmer temperate regions from South Eastern Europe to Japan (Beckett *et al.*, 2007). The values of hematological indices in domestic and wild birds could be an important source of information with valuable diagnostic meaning (Miller *et al.*, 2001). They could provide or support an objective assessment of the health status and could support the correct diagnosis in different pathological states (Hauptmanova *et al.*, 2002). This has motivated the publication of a large number of scientific reports in various free living or captured avian species (Palvak *et al.*, 2005). At present there is no alternative but to use antibiotics to prevent the considerable loss to the domestic and wild birds due to various bacterial and other infections (Kamruzzaman *et al.*, 2005). Antibiotics are the most widely used drugs in veterinary medicine, tilmicosine is a veterinary macrolide antibiotic which has been prepared by chemical modification of desmycosin. It has been used in therapy of different diseases in livestock and poultry (Modric *et al.*, 1999). The possibility of antibiotics ceasing to be used as growth stimulants for farm animals and the concern about the side effects of their use as therapeutic agents has produced a climate in which both consumer and manufacturer are looking for alternatives (Kamruzzaman *et al.*, 2005). Probiotics are being brought under consideration to fill this gap and already some farmers are using them in preference to antibiotics (Fuller, 1989). Liver function test is one of the most common blood tests. Abnormal results in the liver function test often cause considerable anxiety in asymptomatic subjects. It may lead more investigations to ascertain if there is underlying serious liver disease. The most common abnormalities of liver function test in an asymptomatic person is alanine aminotransferase (ALT) and aspartate aminotransferase (AST) (Giannini *et al.*, 2005). In modern poultry, domestic and wild birds production, different types of growth promotes are used (Abd-El-Rahman *et al.*, 2012). The public concern about resistant pathogenic bacteria in humans lead to increasing pressure by the consumer for a reduction or ban on the use of nutritive antibiotics (Awaad and Zouelfeker, 2001). Probiotics are new products which are live microbes grow in the gastrointestinal tract and create beneficial conditions for nutrients' utilization and inhibit the growth of pathogenic bacteria in the host (Amer and Khan, 2012). It has been reported recently that utilization of probiotics in animal nutrition is of economic and health benefits (Gardiner *et al.*, 2004). The present study therefore was aimed to evaluate the effect of probiotics (Chunchine.Geyao[®]: China) and antibiotic (tilmicosin phosphate) on the performance and hematological and biochemical parameters of Collared Dove (*Streptopelia decaocto*).

MATERIALS AND METHODS

The birds used in the present study were apparently healthy adults of both sexes of Collared Dove (*Streptopelia decaocto*) were commonly obtained from a local market in Mosul, Iraq from October and November 2013. The birds were individually kept in captivity cages (80 × 60 × 70 cm) of about 25 C° with water and poultry feed available *ad libitum* for 7-14 days before experiments. All the experiments were complied with institutional regulations addressing animal use, and proper attention and care were given to the birds used in this study.

Experimental design

Collared Dove were randomly divided into four groups (10 birds per group) and fed for 35 days the following diets:

1. Group A (control): Diet contained essential nutrients optimal to the requirements of birds (NRC, 1984).
2. Group B: Probiotic (Chunchine.Geyao[®]: China) 1.5gm / liter drinking water.
3. Group C: Antibiotic (tilmicosin phosphate-Tilmivap[®]: Jordan) 0.3ml / liter drinking water.
4. Group D: Probiotic (Chunchine.Geyao[®]: China) 1.5gm and Antibiotic (tilmicosin phosphate-Tilmivap[®]: Jordan) 0.3ml / liter drinking water.

The body weight of each bird of all the four groups was taken weekly during the 35 days of experimental period (Kamruzzaman *et al.*, 2005).

Sampling and analysis

At the end of experiment (35) days the control and treated birds were euthanised by decapitation and blood samples were collected using heparin zed test tubes. The hematological studies were performed within two hours of blood collection. Total erythrocyte count (TEC), White blood cell count (WBC) were obtained with haemocytometer. The differential WBC counts were determined on the same blood smears, by counting 200 WBC from a representative part of the smears.

Hemoglobin (Hb) concentration (g/dl) and packed cell volume (PVC %) were determined by sahli haemometer and microhaematocrit methods, respectively immediately before serum separation by blood centrifugation (Shanghai instruments factory 80-2 centrifuge, China) at 3000 cir/min for 15 minute.

Mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC) levels were calculated.

Serum biochemical (total cholesterol) analysis, estimation of Alanine Aminotransferase activity (ALT) and Aspartate Aminotransferase activity (AST) in the serum were performed by (Reflotron plus 2011, Roche, Germany) the instrument is work on the principle of reflectance photometry (Grunenberg *et al.*, 1995).

Statistical analysis

Analysis of data was performed using analysis of variance ANOVA test by SPSS program (ver.12) to determine mean \pm S.E. Duncan's Multiple range test were used to determine significant difference between the groups at $P \leq 0.05$ (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Effect of probiotic and antibiotic supplementation on body weight gain is present in (Table 1). The body weight gains corresponding to the different treatments did not differ significantly ($P \leq 0.05$) in all groups. The results obtained coincide with the finding of Ergun *et al.*, (2000) who stated that supplementation of probiotic, with or without antibiotic, to the rations has no important effect on live weight gain. In comply with Yeo and Kim, (1997) results, the body weight increases in birds only during the first 3 weeks but not during adult of age, but contradicted with Pradhan *et al.*, (1998) and Islam *et al.*, (2004), they stated that supplementation of probiotics can be increase significantly the weight gains.

Table 1: Effect of probiotic and antibiotic supplementation on body weight gain in Collared Dove (*Streptopelia decaocto*)

Groups of birds *			
(control)	Probiotic 1.5gm /liter drinking water	Antibiotic 0.3ml/litter drinking water	Probiotic 1.5gm and antibiotic 0.3ml/litter drinking water
116.451g \pm 18.80 a	120.276g \pm 6.63 a	118.467g \pm 51.09 a	119.345g \pm 43.18 a

* Mean \pm S.E. for 10 birds in each group.

Similar letters mean un significant differences $P \leq 0.05$.

The results of hematological parameters are summarized in (Table 2), it was obvious that probiotic and antibiotic has no significant effect on hematological parameters, this results agreed with Kander, (2004), which may due to that the Probiotic and antibiotic has no direct effects on hematological values, and the age

was likely to be a factor affecting the blood forming process and this data suggested that as a birds grew up, the ability to synthesized hematological parameters also increased and became stable in adults (Kander, 2004). This results agreed with results of Mohan *et al*, (1996), who reported that the packed cell volume not varied with probiotic supplementation. The present contradicted results with Islam *et al.*, (2004), who reported that the hematological parameters are increased significantly in Probiotic and antibiotic supplementation. It was obvious that the probiotics and antibiotics supplementation has no direct effects on Hb concentration, PCV%, MCV(%), MCH(pg) and MCHC (%).

Table 2: Individual comparison of the mean values of certain hematological parameters corresponding to the treated groups with the mean of control group

Groups of birds *				
Parameters	(control)	Probiotic 1.5 gm /liter drinking water	Antibiotic 0.3ml/litter drinking water	Probiotic 1.5gm and antibiotic 0.3ml/litter drinking water
TEC($10^{12}/L$)	4.31 \pm 0.09 a	4.62 \pm 0.03 a	4.49 \pm 0.09 a	4.59 \pm 0.27 a
Hb(g/dl)	11.38 \pm 0.73 a	12.87 \pm 0.58 a	12.30 \pm 0.67 a	13.10 \pm 0.42 a
PCV(%)	36.30 \pm 0.47 a	34.22 \pm 0.43 a	37.42 \pm 0.34 a	34.11 \pm 0.14 a
MCV(fl)	90.89 \pm 0.87 a	91.67 \pm 0.55 a	89.33 \pm 0.86 a	92.20 \pm 1.56 a
MCH(pg)	27.68 \pm 2.12 a	26.89 \pm 3.10 a	28.91 \pm 4.33 a	29.43 \pm 1.33 a
MCHC(%)	31.34 \pm 1.57 a	29.56 \pm 4.59 a	28.08 \pm 1.45 a	30.37 \pm 2.14 a

* Mean \pm S.E. for 10 birds in each group.

Similar letters mean un significant differences $P \leq 0.05$.

From (Table 2) it is noted that there is no significant differences in total number of leukocytes, eosinophil (%), basophil (%) and monocyte (%), but the percentage of heterophil, lymphocyte and H/L ratio were increased in birds receiving both probiotic and antibiotic, the increase in H/L ratio may indicate the response to stress, (Table 3). It is readily accepted that the increase in heterophil, lymphocyte and H/L ratio are indicators of stress in chickens and birds (Post *et al.*, 2003).

Table 3: Individual comparison of the mean values of certain leukocyte parameters corresponding to the treated groups with the mean of control group.

Groups of birds *				
Parameters	(control)	Probiotic 1.5 gm /liter drinking water	Antibiotic 0.3 ml/litter drinking water	Probiotic 1.5gm and antibiotic 0.3 ml/litter drinking water
TLC($10^9/L$)	22.56 \pm 0.57 a	23.69 \pm 1.70 a	23.90 \pm 0.57 a	22.89 \pm 0.95 a
Heterophil(%)	38.42 \pm 0.20 a	44.80 \pm 0.30 b	43.33 \pm 0.38 b	45.20 \pm 0.38 b
Eosinophil(%)	1.87 \pm 0.53 a	1.66 \pm 0.14 a	1.72 \pm 0.36 a	1.59 \pm 0.19 a
Basophil(%)	1.29 \pm 0.33 a	1.32 \pm 0.53 a	1.31 \pm 1.43 a	1.30 \pm 0.39 a
Lymphocyte(%)	49.93 \pm 0.14 a	56.13 \pm 0.22 b	56.36 \pm 0.51 b	54.36 \pm 0.63 b
Monocyte(%)	0.38 \pm 0.69 a	0.35 \pm 0.53 a	0.61 \pm 0.19 a	0.59 \pm 0.20 a
H/L ratio	0.77 \pm 0.40 a	0.85 \pm 0.79 b	0.88 \pm 0.80 b	0.87 \pm 0.27 b

* Mean \pm S.E. for 10 birds in each group.

Similar letters mean un significant differences $P \leq 0.05$.

Cholesterol levels in avian blood are affected by age, heredity, nutrition and various diseases (Thongsong *et al.*, 2008). (Table 4) shows that serum cholesterol level was significantly ($P \leq 0.05$) lower in birds receiving diets containing probiotics, this results were in agreement with (Panda *et al.*, 2006), (Murwani and Bayuardhi, 2007). Additionally, Kalvathy *et al.*, (2006) as well reported that the cholesterol in the livers and carcasses of broilers was also lower in birds fed with diets containing lactobacillus. The differences between the results of this study and others could be due to the difference in strain/species of probiotic microorganism used or the rout of administration. Moreover, the age of birds also played a part in the level of cholesterol, it may be that cholesterol is required during growing period for the development of muscle and tissue (Thongsong *et al.*, 2008). In order to assess the potential health benefits to consumers of cholesterol levels in birds, the results of this work indicates that the birds supplemented with antibiotic (tilmicosin phosphate) has a significant increase in serum cholesterol levels. Our result (Table 4) agreed with the Murwani and Bayuardhi, (2007), who suggested that antibiotic in feed and the medication programs of broilers can affect the lipid and hepatic metabolism of broilers and be reflect by an increase in serum cholesterol.

Serum aminotransferase (ALT and AST) values were significantly decreased in all three groups in comparing with control group (Table 4). This result agree with Mathivanan and Kalaiorasi, (2007), who demonstrated that ALT and AST were differ significantly in birds treated with probiotic and antibiotic. This result may be due to the beneficial effect of probiotic on the hepatic cells leading to decrease in serum ALT and AST (Mathivanan and Kalaiorasi, 2007). The decreasing effects of antibiotic to ALT and AST in this study may be caused by a lower enzyme activity (Nikpiran *et al.*, 2013). But this study finding is disagree with Islam *et al.*, (2004) who find that ALT and AST not significantly affected by probiotic and antibiotic treatments.

From the present study, appeared that there was no effects of probiotics and antibiotics in growth performance of Collared Dove (*Streptopelia decaocto*), and suggest that supplementation of probiotic and antibiotic has significant influences on hematology and biochemical parameters in Collared Dove (*Streptopelia decaocto*).

Table 4: Values of serum total cholesterol, ALT and AST in Collared Dove (*Streptopelia decaocto*)

Groups of birds *				
Parameters	(control)	Probiotic 1.5gm /liter drinking water	Antibiotic 0.3ml/litter drinking water	Probiotic 1.5gm and antibiotic 0.3ml/litter drinking water
Total serum cholesterol (mg/dl)	64.67±1.21 a	59.46±0.40 b	73.96±5.22 c	56.12±5.65 b
ALT (IU/L)	16.29±0.79 a	11.65±0.54 b	10.45 ±1.22 b	11.76±0.47 b
AST (IU/L)	215.98±1.65 a	140.12±0.97 b	142.28±0.78 b	147.65±0.42 b

* Mean ± S.E. for 10 birds in each group.

Similar letters mean un significant differences $P \leq 0.05$.

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