International Journal of Natural Sciences (2015), 5(1): 35- 40

www.ijns.net

pISSN : 2221-1012
eISSN : 2221-1020

Effects of commercial layer feed supplementation on haematological and reproductive parameters of indigenous duck in rural area

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[Received: May 28, 2015; Accepted: June 3, 2015]

ABSTRACT

This study was carried out to evaluate the effects of supplementation of commercial layer feed on body weight, egg production and haematological profile of the laying ducks rearing under the rural condition of Bangladesh. Twenty indigenous ducks (Khaki Campbell x Local duck) of 24 weeks old was selected from a farm and randomly divided into four equal groups (n=5) and numbered as group T_0, T_1, T_2 & T_3. The different amount of feed was supplied into four groups for three months. The all four groups (T_0, T_1, T_2 and T_3) were fed with routine feeding in scavenging condition. But T_1 group supplemented with 120 gm, T_2 group 60 gm and T_3 group 30 gm of commercial feed. Significant differences were found in both egg production and haematological profile of ducks in compared to control group. Egg production was significantly ($P<0.01$) higher in T_1 group compared to other groups. During the study the body weight gain were shown the same pattern being significantly ($P<0.05$) higher in T_1 group compared to T_0, T_2 and T_3 groups. On the other hand, the values of total erythrocyte count (TEC), total leukocyte count (TLC), haemoglobin content (Hb) and packed cell volume (PCV) increased significantly ($P<0.05$) in the groups of T_1 and T_2 compared to the control group (T0). But the value of MCV, MCH and MCHC of T_1, T_2 & T_3 groups decreased significantly ($P<0.05$) than that of the control group. Results of the present study revealed that the amount of supplementation of commercial layer feeds was very important for improving the haematological profile and egg production of ducks. So, the additional commercial layer feed supplementation may be beneficial for duck farming.

Key words: Duck, feeds, haematological profile, body weight, egg production.

INTRODUCTION

Poultry sector developed tremendously in the last two decades in Bangladesh. Now a days, thousands of small and large scale of poultry farm is available in our country. Among all the industrial sectors, on which the economic strength of Bangladesh depends, poultry sector is one of the most rising, vital and prominent one. Poultry sector is a very flourishing and promising arena of the country for her economic development.

Poultry keeping is an integral part of the rural farming system that provides family income for the small, marginal and landless poor. Among poultry populations there are about 39.08 million ducks in Bangladesh [1] with an average of 4.16 ducks per household [2], of which 95 per cent are of indigenous. It was found that 78 percent of egg and 86 percent of poultry meat is produced by the smallholders under scavenging condition [3]. Rearing of ducks gives maximum return with minimum cost. Ducks are traditionally raised under scavenging by the smallholders in coastal and low-lying areas, with little or no feed supplementation. Duck production in the Haor region (Habiganj) of Bangladesh provides self-employment for landless and small farmers. There is a great potentiality of improving the productivity of ducks in coastal and Haors areas through supplementary feeding. Ducks, being an important poultry species, can contribute efficiently in increasing egg and meat production than chicken in the low lying areas in Habiganj district. From selling ducks and eggs most of the households earn huge money per month. Agricultural resources for scavenging duck rearing system is considered to have potential both for poverty alleviation and food production, especially for the rural poor women.

Analysis of normal hematological parameters of duck is very much essential in diagnosing the various pathological and metabolic disorders. It can be used as a diagnostic tool in order to assess the health status of an individual and/ or a flock [4]. Haematological changes are routinely used to determine various status of the body and to determine stresses due to environmental, nutritional and / or pathological factors. Because of these facts, during the recent decades the avian physiology is found to be of great importance to the scientists, researchers and veterinarians as well as poultry growers.

Haematological values of duck are influenced by age, sex, breed, climate, geographical location, season, day length, time of day, nutritional status, life habit of species, present status of individual and such other physiological factors [5].Therefore, the present study was designed to assess the egg production potential and haematological parameters of native duck under scavenging conditions with different level of feed supplementation.

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MATERIALS AND METHODS

This study was conducted at Ajmiriganj Upazilla of Habigonj district in Sylhet division. Twenty laying indigenous ducks (Khaki Campbell X Local duck) of 24 weeks old was collected from a farm and randomly divided them into four equal groups (n=5) and numbered them as group T_0, T_1,T_2&T_3. Four different level of feed supplementation were considered for four different treatments. The treatment was continued until the peak production reached that is 34 weeks of age. So the rearing period of these ducks was 3 months (March-June) and observed the result for this period. The laboratory analysis of the experiment was done in the District Veterinary Hospital, Habiganj, Sylhet and Horekrisno Diagnostic Center, Ajmiriganj, Habiganj. The following methodology was adopted for performing the experiment.

Experimental Ducks

The research work was conducted using twenty indigenous ducks of 24 weeks old. First; all ducks were treated with anthelmintic piperazine citrate, doses of 1 gm for 7 ducks. After seven days of deworming, all ducks were vaccinated against duck plague virus disease. The ducks were grouped randomly as T_1, T_2, T_3 and T_0. Each group comprised of five ducks and was allocated to different respective treatment. The initial body weights of each duck were recorded. The egg production, body condition, body weight and haematological parameters were also recorded on post treatment.

Marking of ducks

Each ducks of every group were leg banded with 4 different colour, $T_1$was pink banded, T_2 was red banded, $T_3$was black banded and $T_0$was green banded. Except the T_1, the other three treatments were colour sprayed on their head similar to their leg band to identify the particular eggs from particular duck. Four coloured signature pen similar to the leg band colour were used to give mark in the egg.

Feeding Management

We had **c**ollected commercial layer feed from Nourish Feed Company for treating the experimental duck. Four different level of feed supplementation were considered as four different treatments. Treatment-1 (T_1) was supplementary feed (120 g) with intensive feeding condition, Treatment-2 (T_2) was 60 g of feed with scavenging feeding condition, and Treatment-3 (T_3) was 30 g of feed with scavenging feeding condition and Treatment-4 (T_0) was fully scavenging without additional feed. Daily feed supply was weighed into polythene bags with 120 g, 60 g and 30 g. Then the packets of feed were distributed among the group. In the early morning when the birds were taken from night shelter to the pens, half of the feed from 120 and 60 g were given to the T_1 and T_2, but in $T_3$the whole amount (30 g) were given to the bird. Rest of the feed from T_1 and $T_2$was given at afternoon (2 pm). During the time of feeding the door of T_2 and T_3were closed to make sure that no feed waste was in the feeder.

Blood Collection and haematological studies

Blood was collected aseptically with sterile syringe and needle either from heart or from the wing vein of four different groups of birds. Immediately after collection, blood was transferred to sterile test tube containing anticoagulant (EDTA- .2 mg / ml of blood). The hematological studies were performed within five hours after collection of blood by method of Lamberd and Rothstein [6]. Haematological studies were total erythrocyte count (TEC), total leukocyte count (TLC), estimation of hemoglobin (Hb), determination of packed cell volume(PCV), determination of erythrocyte sedimentation rate (ESR), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC).

Statistical Analysis:

The obtained results were statistically analyzed using the standard computerized procedure Microsoft Excel-2010 for determination of mean, standard deviation, level of significance, standard error.

RESULTS AND DISCUSSIONS

The present research work was conducted to assess the efficiency of level of feed supplementation to indigenous duck under rural condition of Bangladesh (scavenging) in order to increase egg production and hematologic values. The results of present research work were stated and discussed under the following headings to investigate the hematological parameters and reproductive performance of duck in rural condition.

Effects of supplementation of commercial layer feed on Body weight

The initial body weight of each groups were found approximately same (Table 1). At the end of experiment, the body weight of T_0, T_1, T_2 and T_3groups were 1.40 kg, 2.24 kg, 2.16 and 1.57 kg, respectively (Table 1). Body weight gain was significantly different (P<0.05) between the treatments at the end of the experiment. The body weight gain of $T_1$was significantly (P<0.05) increased compared to other groups (T_0, T_2 and T_3). The additional feed supplementation may increase the body's cellular growth in addition to egg formation.

Table 1. Effects of commercial layer feed on physical condition and body weight (Mean±SE) of experimental ducks

Parameters	Group To		GroupT$_1$		GroupT$_2$		GroupT$_3$	
	Initial body wt. (Mean± SE)	Final body wt. (Mean±SE)	Initial body wt. (Mean± SE)	Final body wt. (Mean±SE)	Initial body wt. (Mean± SE)	Finalbody wt.(Mean±SE)	Initial body wt. (Mean ±SE)	Finalbody.wt (Mean±SE)
Feather	Rough	Less shiny	Rough	Smooth & shiny	Rough	Smooth & shiny	Rough	Smooth
Body wt. (kg)	1.34±0.03	1.40±0.05	1.34±0.05	2.24**±0.05	1.29±0.03	2.16**±0.07	1.34±0.01	1.57*±0.07
Wt. gain (%)	5.22%		70.8%**		62.7%**		17.91%	

* Significant (P<0.05)
** Significant (P<0.01)
SE= Standard Error

Effects of supplementation of commercial layer feed on egg Production

The total egg production of the experimental ducks was shown in Table 2. The total egg laying period was about 2.5 months i.e. April to mid-June. It was found that ducks fed 120 g feed (intensive condition: T_1) had significantly higher egg production than in other treatments (P<0.01). Birds with 60 g feed and scavenging condition (T_2) attained higher egg production in comparison with T_3 (30 g feed and scavenging condition) and T_0 (fully scavenging without feed supplementation). No significant differences (P>0.05) were found between T_3 and T_0 in egg production during the experimental period. Egg production was significantly higher in T_1than other treatments, being partially in agreement with Rahman *et al*.[7] where they found 54.45% egg production in RIR X Fayoumi(Sonali) during 52 weeks of experimental period in an adlibitum fed group than 36.15% by 75 g and 21.37% by 25 g supplemented group under scavenging condition. Demeke [8] also found that intensive feeding and scavenging plus 120 g/d supplementation gave significantly higher egg production in White Leghorn than the lower level of supplementation (90, 60 and 30 g/d) and concluding that in the scavenging systems egg production is linearly related with the level of supplementation. The effect of 60 g supplementation in present study was lower than the egg production percentage by 75 g supplementation in the above study. Irrespective of breeds, Islam *et al*.[8] also reported that the highest hen housed egg production was achieved by 70% supplementation followed by 50% and 30% supplementary feeding respectively. In the present study the 60 g, 30g and 0 g feed supplementation is equivalent to 50%, 25% and 0%, showing that 60 g gave significantly more egg than 30 g and 0 g being in agreement with Islam *et al*., [9].

Effects of supplementation of commercial layer feed on egg weight

The egg weight of the experimental ducks was shown in Table 2 .It was found that ducks fed 120 g feed (intensive condition: T_1) had significantly higher egg weight than in other treatments (P<0.01).On the other hands it was found that egg weight was significantly lower (P<0.01) in ducks with no supplementation of feed at scavenging condition (T_0). No significant difference (P>0.05) was observed between treatments with feed supplementation and scavenging condition (T_2 and T_3). The significant difference in egg weight agreed with the results of Rahman *et al*. [10], but in their study the egg weight in RIR X Fayoumi (Sonali) of different treatment groups (adlibitum, 75g supplementation and 25 g supplementation) were much more higher than the present study.

Effects of supplementation of commercial layer feed on egg yolk colour

The effect on egg yolk colour of ducks by commercial feed supplementing with daily feed was shown Figure 1. It was found that ducks fed 120g feed (intensive condition: T_1) produced lighter yolk than scavenging birds. Yolk colour was darker in T_0. No differences were found in yolk colour between $T_2$and T_3. The colour of the yolk was determined by the presence and absence of xanthophylls some of which are precursor of vitamin A [10]. Therefore the colour of the yolk was influenced to a large degree by nutrition and dark yellow yolks could be produced due to feeding laying birds on grass meal [11, 12]. The yolk colour score was higher in free range

system comparing to intensive condition [13, 14]. The darker yellow colour in scavenging birds than in the T_1 (intensive condition) was due to the access of natural sources of feed supplied to these birds though the diet contained yellow maize in T_1

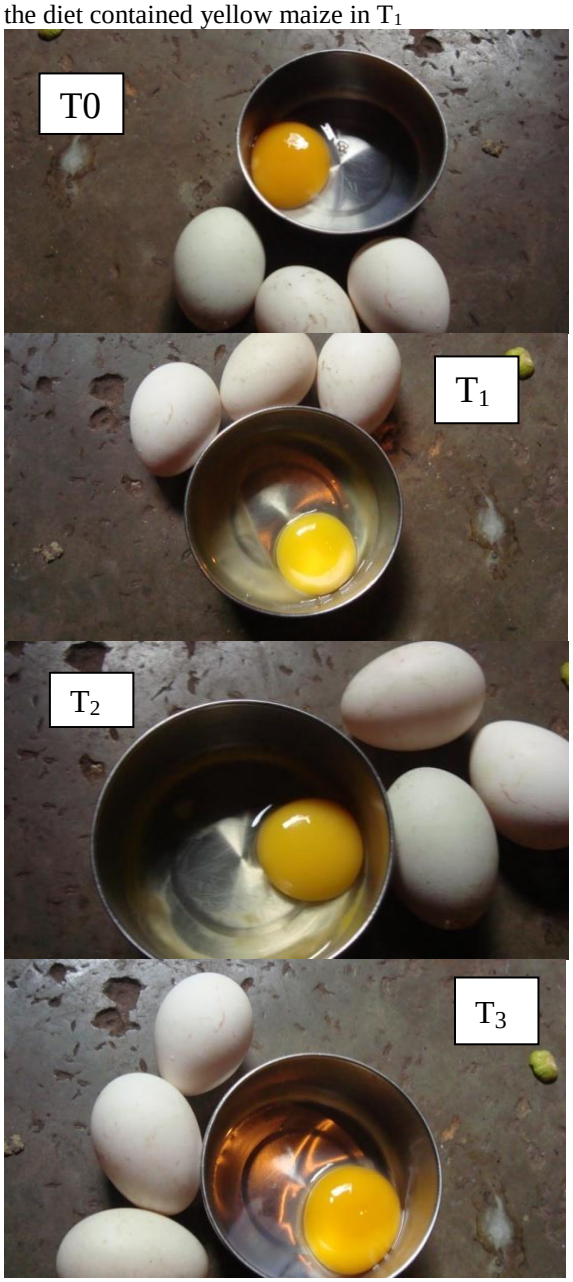

Figure 1 .Differences in the egg yolk color of different groups-T_o, T_1, T_2 and T_3

The hematological parameters were presented in table 3. In this study the post treatment of the mean value of Hb were 8.08 gm %, 7.96 gm %, 7.42 gm% and 7.3 gm %; mean value of PCV were 41.8%, 39.86%, 34.85% and 32.83%; mean value of ESR were 1.38, 1.1, 0.84 and 0.68 mm in first hour; mean value of TEC were 3.79, 3.58, 3.19 and 2.94 million/mm^3 of blood; mean value of TLC were 24.56, 22.99, 21.62 and 21.42 thousands/mm^3; mean value of MCV were 110.41, 111.39, 110.68 and 113.6158 fl, mean value of MCH were 21.34, 22,24, 23.50 and 25.30 pg; mean value of MCHC were 19.43, 20.00, 21.31 and 22.24% respectively for the ducks in treatment group T_1, T_2, T_3 and T_0. It was evident that the values of total erythrocyte count (TEC), total leukocyte count (TLC), hemoglobin content (Hb) and packed cell volume (PCV) increased significantly ($P<0.05$) in the ducks of T_1 and T_2 compared to the control group (T_0) but the value of MCV, MCH and MCHC in the ducks of T_1, T_2& T_3 decreased significantly ($P<0.05$) than that of control group. This result partially agree with the findings of Islam *et al.*[9], who found that the mean value of TEC in intensive chicken was slightly higher but in local chicken slightly lower than intensive chicken. Lowered erythrocyte count were detected at younger birds and increases with the advancement of age in the present study and this findings were was consistent with the findings of Dukes [5]; Kai and Prankin [15]; who reported that erythrocyte number was lower in early age and gradually increases with ages. However, no significant changes were observed in MCV, MCH and MCHC in their study.

The recorded ESR in present study was inversely proportional to the age that means higher ESR in early age and decreases gradually as age increases. The recorded maximum values of ESR in T_1 group was 2.42±0.06 mm in 1sthour at 5thmonth and the minimum value was 1.38±0.05 mm in 1st hour which was found at 8th month of age. Higher ESR at early age in the present study was agreed with the result of Sturkie [16] , Kundu *et al*. [17] and Levi *et al*., [18, 19]. Bibert [20], and Sturkie [16] stated that there were many factors responsible for ESR.

Effects on mortality rate

Among the four treatment groups 1 duck from T_0 were died during the experimental period. The tentative causes of mortality were diagnosed by the post mortem examination. One ducks of group$T_0$was died by chronic respiratory disease (CRD).

CONCLUSION

The supplementation of commercial layer feed is helpful for improving hematological parameters and reproductive performance of indigenous duck. However, the amount of supplementation is also dependent on location and availability of feed resources around the farmer's house. Better economic condition of farmer and enough feed resources around farmer's house may need less feed supplementation. Further research should conduct to achieve more information among this field for profitable duck farming in the Haor area of Bangladesh.

ACKNOWLEDGEMENT

The presented study was supported by department of physiology, Faculty of Veterinary and Animal science, Sylhet Agricultural University, Sylhet

We are thankful to Upazilla Livestock office, Habigonj sadar and Ajmiriganj, Habigonj and Hore Krishna Diagnostic Centre for their technical assistant and co-operation.

Table-2. Reproductive performance (Mean ±SE) of different treatments group during the experimental period (n=5)

Parameters	GroupTo		GroupT$_1$		GroupT$_2$		GroupT$_3$	
	Mean±SE	Pvalue (p>t)	Mean±SE	Pvalue (p>t)	Mean±SE	Pvalue (p>t)	Mean±SE	Pvalue (p>t)
Egg production during experimental period (no.)	65.8±2.6	0.00	85.4**±1.4	0.000	83.2**±1.5	0.000	69.4±2.6	0.181265
Egg weight (gm)	64.2±.73	0.00	73.4**±0.68	0.000	71.8**±0.80	0.000	68*±1.0	0.010167
% of egg production	73.1 %		94.8%		92.4%		77.1%	
Egg yolk colour	Dark yellow (++++)		Light yellow (+)		Light yellow (++)		Dark yellow (+++)	

* Significant (P<0.05)
** Significant (P<0.01)
SE= Standard Error

Table 3.Effects of supplementation of commercial layer feed on hematological paramaters (Mean±SE) in the experimental ducks (n=5)

Parameters	GroupT$_0$		GroupT$_1$		GroupT$_2$		GroupT$_3$	
	Mean±SE	Pvalue (P>t)	Mean±SE	Pvalue (P>t)	Mean±SE	Pvalue (P>t)	Mean±SE	Pvalue (P>t)
Hb (gm%)	7.3±0.04	0.00	8.08**±0.07	0.000	7.96**±0.14	0.003	7.42*±0.07	0.107714
PCV (%)	32.8±0.40	0.00	41.8**±1.4	0.001	39.8**±1.05	0.000	34.8*±0.71	0.023212
ESR (mm in 1^{st} hr)	0.68±0.08	0.000	1.38**±0.05	0.000	1.1**±0.03	0.002	0.84*±.12	0.157699
TEC (million/cu.mm. of blood)	2.94±0.19	0.000	3.79**±0.03	0.005	3.58*±0.04	0.014	3.19±0.17	0.181818
TLC (thousand/cu. mm. of blood)	21.42±0.3	0.000	24.56*±1.2	0.03	22.99*±0.44	0.011	21.62±0.88	0.419398
MCV(fl)	113.61±7.5	0.000	110.41±4.1	0.364	111.39±3.1	0.397966	110.39±7.0	0.391299
MCH (pg)	25.30±1.8	0.000	21.34±0.20	0.046	22.24±0.39	0.082577	23.50±1.19	0.216412
MCHC (%)	22.24±0.24	0.000	19.43±0.66	0.005	20.0±0.39	0.001139	21.31±0.38	0.039918

* Significant (P<0.05)
** Significant (P<0.01)
SE= Standard Error

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