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Haematological Parameters of Fayoumi, Assil and Local Chickens Reared in Sylhet Region in Bangladesh

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Abstract: An experiment was conducted to study the hematological parameters in Fayoumi, Assil and Local Chickens of different ages reared in Sylhet region. 250 chickens of three breeds (100 Fayoumi, 50 Assil and 100 Local) were tested at different ages (1, 3, 6, 9 and 12 months) to observe the hematological parameters: i) Total erythrocyte Count (TEC) ii) Packed Cell Volume (PCV) iii) Determination of Hemoglobin (Hb) iv) Erythrocyte Sedimentation Rate (ESR) v) Differential Leukocyte Count (DLC) vi) Mean Corpuscular Volume (MCV) vii) Mean Corpuscular Hemoglobin (MCH) viii) Mean Corpuscular Hemoglobin Concentration (MCHC). Erythrocyte numbers, hemoglobin concentration and packed cell volume increased with the advancement of age in all three breeds. The TEC was higher in Fayoumi. The hemoglobin concentration was high in Assil. The PCV was slightly different or similar in all three breeds. ESR was inversely related to the age. Higher ESR in early age and lower in the advancement of age. The Fayoumi showed the higher ESR compared to other two breeds. The ESR of last two groups (9 and 12 months) of Assil and all groups of Local Chickens were negligible. Lymphocytes and heterophils were two principal leukocytes, which exert their dominance on other leukocytes. Among three breeds Local chickens possess the higher lymphocyte percentage. The heterophils were higher in Fayoumi breed. Monocyte was lower in Assil and Local chickens. Eosinophils were higher in number in local and Assil compared to Fayoumi. Higher MCV was recorded in Local chickens followed by Assil and Fayoumi chickens. MCH values were near about similar in Assil and local chicken but lower in Fayoumi breeds. The MCHC values of all three breeds were almost nearer to each other. The above study has highlighted some of the normal hematological parameters of chicken mostly reared in Sylhet region. However, more detailed study could be conducted in this regards.

Key words: Haematological parameters, chickens (fayoumi, assil, local breed)

Introduction

In Bangladesh Poultry meat contributes approximately 37% of total animal protein supplied in the country (Rahman and Rahman, 1998). Poultry sector developed tremendously in the last two decades in Bangladesh. Now-a-days thousand of small and large scales of poultry farm are available in our country. Sylhet is the northeast part of Bangladesh and recently declared as Division. There is less number of poultry farms in Sylhet comparing with other region of Bangladesh. Now-a-days farmers are getting steps to set poultry farms in Sylhet region as industry. There are many household mini farms consisting of 10-50 Fayoumi and/or local chickens. Government poultry farm, Sylhet has been playing an important role by supplying Fayoumi chickens among the farmers. Rearing of local chickens is a tradition of Sylheti people. Assil is reared as a plying bird. Cockfight is a famous game for recreation in Sylhet region and that is why they rear one to more Assil cocks in their house. Analysis of normal hematological parameters of chickens 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.

Hematological changes are routinely used to determine various status of the body and to determined 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.

Hematological values of chickens 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 (Dukes, 1955). For proper management, feeding, breeding, prevention and treatment of diseases; it is desirable to know the normal physiological values under local conditions but normal hematological information of the valuable birds is hardly available in the literature as researches on these line have rarely been carried out under local condition. The present research was undertaken.

To investigate hematological parameters, such as Total Erythrocyte Count (TEC), Hemoglobin (Hb) concentration, Erythrocyte Sedimentation Rate (ESR), Packed Cell Volume (PCV), Differential Leukocyte Count (DLC), Mean Corpuscular Volume (MCV), Mean

Table 1: Haematological Parameters (TEC, Hb, PCV, ESR, MCV, MCH, MCHC) in different breeds of Chickens (Fayoumi, Assil and Local Breed) at different ages

Parameters	Breed	1 Month	3 Months	6 Months	9 Months	12 Months
TEC (Erythrocyte number) ($10^6/\text{mm}^3$)	Fayoumi	2.55±0.06	3.18±0.05	3.33±0.03	3.39±0.04	3.46±0.03
	Assil	1.76±0.27	1.93±0.09	2.58±0.13	2.89±0.08	3.05±0.09
	Local	1.70±0.04	1.74±0.02	2.43±0.12	2.69±0.08	2.98±0.21
Hb concentration (gm%)	Fayoumi	7.06±0.6	7.68±0.12	7.90±0.06	7.93±0.07	7.94±0.22
	Assil	8.23±0.17	8.34±0.08	9.14±0.08	9.42±0.16	9.54±0.05
	Local	7.73±0.14	7.76±0.12	8.57±0.04	9.19±0.33	9.37±0.24
PCV (%)	Fayoumi	26.56±0.66	27.38±0.46	28.05±0.63	29.00±0.81	30.08±0.41
	Assil	28.12±0.64	29.05±0.60	29.20±1.36	31.35±1.18	32.25±1.03
	Local	27.73±1.21	28.36±0.56	31.25±0.77	31.86±1.47	34.60±0.64
ESR in mm in 1 st hour	Fayoumi	3.17±0.18	2.44±0.11	2.06±0.11	1.54±0.17	1.32±0.22
	Assil	1.18±0.12	0.80±0.42	0.30±0.26	0.00±0.00	0.00±0.00
	Local	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00
MCV (cubic micron)	Fayoumi	103.99±2.74	86.18±1.64	84.27±1.94	85.57±2.60	86.99±1.48
	Assil	164.55±35.95	150.78±8.64	113.26±7.53	108.75±5.26	105.88±4.35
	Local	163.56±8.21	163.28±3.64	128.76±6.88	118.47±6.27	116.66±7.57
MCH (micro- micro gram or picogram)	Fayoumi	27.72±0.74	24.19±0.59	23.74±0.29	23.40±0.33	22.97±0.67
	Assil	48.14±10.36	43.30±2.20	35.46±1.91	32.66±0.72	31.33±1.06
	Local	45.59±0.65	44.66±0.61	35.30±1.94	34.16±1.89	31.57±1.82
MCHC (%)	Fayoumi	26.61±0.74	28.07±0.67	28.19±0.74	27.37±0.85	26.40±0.81
	Assil	29.29±1.00	28.75±0.64	31.36±1.44	30.08±1.25	29.61±0.93
	Local	27.93±1.31	27.36±0.78	27.43±0.72	28.88±1.67	27.08±0.89

Mean ± SD values differ significantly ($P < 0.01$) within the same column. TEC = Total erythrocyte Count, PCV = Packed Cell Volume, Hb = Determination of Hemoglobin, ESR = Erythrocyte Sedimentation Rate, DLC = Differential Leukocyte Count, MCV = Mean Corpuscular Volume, MCH = Mean Corpuscular Hemoglobin, MCHC = Mean Corpuscular Hemoglobin Concentration.

Corpuscular Hemoglobin (MCH) and Mean Corpuscular Hemoglobin Concentration (MCHC) and to find out the effect of age and breed variation in hematological parameters of chickens.

Materials and Methods

A total of 250 chickens of different ages of three different breeds (Fayoumi, Assil and Local) randomly collected from Sylhet City and its surroundings of Bangladesh were used in this experiment. The experiment was carried out from July 2001 to June 20002.

Experimental design: Two hundred and fifty apparently healthy chickens of different ages of three different breeds (Fayoumi, Assil and Local) reared in Sylhet region in Bangladesh were used for this study. Among them the number of Fayoumi, Assil and Local were 100, 50 and 100 respectively. The chickens were again divided into five subgroups based on age; 1, 3, 6, 9 and 12 months old.

Blood Collection: Blood was collected aseptically with sterile syringe and needle either from heart or from the wing vein of different groups of chickens depending on

age randomly. Immediately after collection, blood was transferred to sterile test tube containing anticoagulant 1:10 (4% sodium citrate solution). The hematological studies were performed within short time as possible in FDIL (Field Diseases Investigation Laboratory), District Veterinary Hospital, Sylhet and in the Physiology Laboratory of Bangladesh Agricultural University, Mymensingh, Bangladesh.

Statistical analysis: Results obtained were statistically analyzed. Mean standard deviation and analysis of variance were calculated according to the standard procedures and the data were analyzed using completely randomized design (CRD) according to Steel and Torrie (1980) with the help of a computer package MSTAT. The ranking of the analyzed outputs was performed using Duncan's multiple ranged tests (DMRT).

Results and Discussion

Total Erythrocyte Count (TEC): It is evident from the present findings that erythrocyte number increases with the advancement of age, being lowest in 1 month and highest in 12 months of age (Table 1) Lowered

Table 2: Differential Leukocyte Count (DLC) in different breeds of Chickens (Fayoumi, Assil and Local breed) at different ages

		Leukocyte Type(%)				
		Lymphocyte	Heterophil	Monocyte	Eosinophil	Basophil
1 Month						
	Fayoumi	58.75±0.44	30.75±0.44	7.50±0.51	2.25±0.44	0.75±0.44
	Assil	70.20±0.42	20.80±0.92	4.80±0.92	2.90±0.74	1.20±0.42
	Local	71.00±0.73	19.75±0.44	4.50±0.51	3.75±0.44	1.00±0.73
3 Months						
	Fayoumi	60.50±0.51	30.75±0.44	6.25±0.44	2.00±0.00	0.50±0.51
	Assil	69.90±0.74	21.70±2.71	4.50±1.35	2.80±0.42	1.10±0.88
	Local	71.00±0.73	19.50±0.51	4.75±0.44	3.75±0.85	1.00±0.73
6 Months						
	Fayoumi	61.25±0.44	30.50±0.89	6.25±0.44	1.75±0.85	0.25±0.44
	Assil	67.80±0.42	24.40±0.84	2.50±0.53	4.40±0.52	0.90±0.74
	Local	70.50±0.51	19.50±1.15	4.50±1.15	4.25±0.85	1.25±0.85
9 Months						
	Fayoumi	61.50±1.15	30.75±0.85	6.25±0.44	1.25±0.44	0.25±0.44
	Assil	69.20±0.42	22.20±0.42	3.30±0.48	4.80±0.42	0.60±0.52
	Local	71.25±0.85	19.75±0.85	3.40±0.50	4.50±0.51	1.00±0.73
12 Months						
	Fayoumi	61.75±0.44	30.50±0.51	6.25±0.44	1.25±0.44	0.25±0.44
	Assil	69.60±0.84	22.60±1.26	2.80±0.42	4.70±1.16	0.60±0.52
	Local	71.00±0.73	20.00±1.45	4.50±0.51	3.50±0.51	1.00±0.73

Mean ± SD values differ significantly ($P < 0.01$) within the same row.

erythrocyte count at younger age and increases with the advancement of age in this study was consistent with the findings of Dukes (1955); Kai and Franklin (1984), who reported that erythrocyte number is lower in early age and gradually increases with ages. Kundu *et al.* (1993) also reported a lowest RBC in day-old chicks and higher in 3 months old.

Fayoumi chickens had higher RBC number on all sampling days compared to other two breeds and the highest values recorded on 12 months as well. In Fayoumi breed, higher RBC in this study may be due to involvement of genetic factor. The mean value of TEC in Fayoumi is slightly higher but in local chicken slightly lower than reported by Islam *et al.* (1999).

Haemoglobin (Hb): It is evident from the present findings that hemoglobin concentration increases with the advancement of age, being lowest in 1 month and highest in 12 months of age (Table 1). Which is slightly lower as reported by Dukes and Schwarte (1931) and even Datta *et al.* (1994). Assil had greater hemoglobin concentration compared to fayoumi and Local Chickens. The hemoglobin concentration observed in Fayoumi chickens is slightly lower than the observation reported by Islam *et al.* (1999). Higher Hb in Assil is an indication of breed differences. Oyewale (1987) reported a higher Hb concentration in Nigerian domestic fowls. The average lowered Hb concentration may be due to several factors i.e. environment, nutrition and

management procedure.

Packed Cell Volume (PCV): Lower PCV was detected at early age and it is gradually increased with the advancement of age (Table 1). The lowest and highest PCV were observed in 1 and 12 months of age respectively. The results were statistically significant among the breeds.

The results of PCV of Fayoumi and local chickens are slightly lower than the result reported by Islam *et al.* (1999). Lower PCV at early age and it increases with the advancement of age in this study was similar to the findings of Newell and Shaffner (1950); Sturkie and Textor (1960). Variation in PCV due to age, sex, breed and present status of birds have been reported by Lucas and Jamroj (1961); Nirmalon (1973); Montes *et al.* (1983).

Erythrocyte Sedimentation Rate (ESR): Values of ESR in Fayoumi and Assil are inversely related with age, but in local chicken it is negligible (Table 1). Higher ESR at early age in this study was in accordance with those of Sturkie (1954); Kundu *et al.* (1993).

Differential Leukocyte Count (DLC): Local breed of chickens had significantly ($P < 0.01$) higher lymphocyte than other two breeds on all sampling days, where as the lymphocyte numbers are very much nearer in Assil and Local chickens irrespective of age and lymphocytes

are the dominating leukocyte in all breeds (Table 2). A higher Lymphocytes and Heterophils count in this study was consistent to the findings of Sturkie (1965).

In contrast Oyewale (1987) reported that though total WBC count was higher but the lymphocyte count was lower in Nigerian fowls.

Compared to Assil and Fayoumi higher eosinophil count in Local chickens in this study is consistent to Oyewale (1987) who reported higher eosinophil count in Nigerian fowls. Lower eosinophils in Assil and Fayoumi and higher in Local chickens may be an involvement of genetic factor. Higher monocyte count was recorded always in Fayoumi than Assil and Local breed and Local chickens have higher Monocyte count than Assil chickens. In 1 month old, there is no statistical difference but in 3 months old there is statistical difference in Fayoumi compared to Assil and Local. From 6 to 12 months of age there is statistical difference in Local chickens compared to Assil and Fayoumi chickens.

Mean Corpuscular Volume (MCV): It is evident from the findings that MCV decreased with the advancement of age, being highest in 1 month and lowest in 12 months of age (Table 1). MCV values in this study for Fayoumi are slightly lower and for Assil and Local chickens are slightly higher as reported by Sturkie (1965) (30.66 micro-microgram). The MCV values of Fayoumi chickens differ significantly with that reported by Coffin (1955) (37 micro-microgram) and for Assil and Local chickens it differs slightly.

Mean Corpuscular Hemoglobin (MCH): From this findings it is evident that MCH decreases gradually with the advancement of age (Table 1). The results are slightly lower in case of Fayoumi chickens than those reported by Coffin (1955); Sturkie (1965) but in case of Assil and Local chickens the results are coincided or slightly differ with their quoted values.

Mean Corpuscular Hemoglobin Concentration (MCHC): The values show the statistical difference among the breeds (Table 1). The MCHC values in this study that are nearly coincided with those quoted by Coffin (1955); Sturkie (1965).

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