

Comparative Study on Blood Profiles of Indigenous and Ross-308 Broiler Breeders

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Abstract: Some haematological parameters (Differential WBC counts, total white blood cell count (WBC) and packed cell volume (PCV) percentages) and biochemical values (total protein, alkaline phosphatase, alkaline transferase, calcium, phosphorous, magnesium, glucose, triglyceride and cholesterol) of adult indigenous chickens compared with adult industrial broiler breeders (Ross 308). Differences among hematological parameter of Ross-308 and indigenous cocks and Ross-308 and indigenous hens were not significant except for PCV% of Ross-308 (32.60 ± 2.32) and indigenous hens (35.50 ± 2.22) ($P < 0.016$). Comparison of biochemical parameters, showed significant differences only for cholesterol and glucose values between indigenous and Ross-308 hens. Glucose values in Ross-308 hens was higher than indigenous hens (274.50 ± 33.22 mg/dl and 245.60 ± 28.11 mg/dl, respectively) ($P < 0.026$). In addition, cholesterol values in Ross-308 hens was higher than indigenous hens (181.50 ± 33.22 mg/dl and 152.60 ± 28.11 mg/dl, respectively) ($P < 0.026$). No significant differences were observed between biochemical parameters values of Ross-308 and indigenous cocks.

Key words: Haematological Parameters • Leukogram • Biochemical Parameters • Indigenous Chicken • Ross 308 Broiler Breeders

INTRODUCTION

In many species of birds, normal values for hematological and biochemical factors were measured and a comprehensive data base was established as their blood-profiles. Comparative measurements for diverse species of birds could be lead to the different statements of immune system in these birds. In recent years, new researches focuses on village chickens has been developed in many African and Asian countries [1-4]. In the other hand, many researchers have evaluated normal biochemical and hematological parameters of industrial and commercial hybrid chickens [5,6], but there is a little of information about compression of blood profiles between indigenous and industrial chickens. Therefore, this study was carried out to compare hematological and serum's biochemical values between industrial (Ross-308) and Azerbaijan indigenous chickens (*Gallus domesticus*).

MATERIALS AND METHODS

Chickens: Twenty indigenous chickens (10 hens and 10 cocks, with the age of 18 weeks) were purchased from indigenous poultry research center of Urmia agricultural office, west Azerbaijan, Iran. Also, twenty industrial chickens Ross-308 (10 hens and 10 cocks, with the age of 18 weeks) were purchased from a breeder broiler farm in Urmia city. These chickens transmitted to the Faculty of Veterinary Medicine, Urmia University and were housed in four separate groups with same rations and environmental conditions for eight weeks and received no vaccines in the experimental period. After eight weeks, blood samples including 2ml of blood for serum biochemical tests and 1ml of blood in vials with 2mg ethylene-diamine tetra-acetic acid (EDTA) for haematology were collected from the brachial vein as described [7].

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Haematology: Differential white blood cell count [WBC] counts were made on monolayer blood films, fixed and stained with Giemsa-Wright's stain. Total (WBC) count was determined by a manual method using haemocytometer. Packed cell volume (PCV) was measured by a standard manual technique using microhaematocrit capillary tubes and centrifuged at 2500 rpm for 5 min [8].

Biochemical Parameters: Serum biochemical parameters including total protein (TP), alkaline phosphatase (ALP), alkaline transferase (ALT), calcium, phosphorous, magnesium, glucose, triglyceride and cholesterol) were determined in a Technicon RA 1000 Autoanalyzer (Technicon Instruments Corporation, Tarrytown, New York, USA).

Statistical Analysis: All values of hematological and serum's biochemical values were expressed as mean ± standard deviation. Two-tailed student test from SPSS were used for statistical analysis of the results. The level of significance was reported at less than $P < 0.05$ [9].

RESULTS

The results of haematological and biochemical parameters were given in mean ± standard error means for each value in Table 1.

As shown in table 1, results of present study showed that there are significant statistical differences between blood profiles of indigenous and Ross-308 adult chickens as follow:

Haematological Parameters

Cocks of Indigenous and Ross-308: No significant differences were observed among values haematological parameters for cocks of indigenous and Ross-308 chickens.

Hens of Indigenous and Ross-308: Comparison of haematological parameters of hens of indigenous and Ross-308, showed significant difference ($P < 0.016$) only for PCV values but not showed for others parameters.

Biochemical Parameters:

Cocks of Indigenous and Ross-308: No significant differences were observed among values of biochemical parameters for cocks of indigenous and Ross-308 chickens.

Hens of Indigenous and Ross-308: Comparison of values biochemical parameters for hens of indigenous and Ross-308, showed significant differences only for cholesterol and glucose values ($P < 0.026$ and $P < 0.026$, respectively) but not showed for other parameters.

Table 1: Comparison of blood profiles for indigenous and Ross 308 adult-chickens

Parameters	Indigenous		Ross-308	
	Cock	Hens	Cock	Hens
Haematocrit (%)	46.10 ± 2.85	35.50 ± 2.22 ^a	48.80 ± 4.31	32.60 ± 2.32 ^b
WBC ($\times 10^3/\mu\text{l}$)	9920 ± 1560.66	8885 ± 1850.39	10220 ± 1648.43	8850 ± 2129.72
Heterophil (%)	28.30 ± 3.77	38.60 ± 2.95	30.20 ± 5.39	37.80 ± 4.82
Lymphocyte (%)	65.39 ± 4.50	51.90 ± 4.46	61.60 ± 6.60	53.00 ± 4.14
Monocyte (%)	3.40 ± 1.07	3.90 ± 1.37	3.70 ± 1.16	3.70 ± 1.34
Eosinophil (%)	2.60 ± 1.26	3.50 ± 1.43	3.40 ± 1.17	3.40 ± 1.50
Basophil (%)	0.40 ± 0.52	2.10 ± .99	1.1 ± 1.1	2.10 ± 0.99
Albumin (g/dl)	2.77 ± .70	4.12 ± 0.46	2.43 ± 0.42	3.86 ± 0.76
ALT (IU/L)	7.80 ± 1.62	7.20 ± 1.47	10.20 ± 2.25	7.90 ± 1.91
AST (IU/L)	191 ± .89	125.20 ± 11.76	198.40 ± 14.06	119.00 ± 13.32
Total Protein (g/dl)	3.87 ± .70	5.22 ± 0.46	3.53 ± 0.42	4.96 ± 0.76
Glucose (mg/dl)	260.60 ± 35.68	245.60 ± 28.11 ^a	260.50 ± 18.71	274.50 ± 33.22 ^b
Triglyceride (mg/dl)	79.20 ± 14.57	64.80 ± 13.28	89.90 ± 13.08	71.10 ± 17.21
Cholesterol (mg/dl)	167.60 ± 35.68	152.60 ± 28.11 ^a	74.50 ± 18.71	181.50 ± 33.22 ^b
Calcium (mg/dl)	11.32 ± 1.54	9.36 ± 0.58	12.19 ± 1.23	9.28 ± 0.91
Phosphorous (mg/dl)	5.07 ± 0.69	4.23 ± 0.26	5.57 ± 0.56	4.44 ± 0.43
Magnesium (mg/dl)	1.99 ± 0.27	1.65 ± 0.10	2.15 ± 0.2	1.64 ± 0.16

Different letters in row indicate significance at level $P < 0.05$

DISCUSSION

Blood profiles to be a reliable health indicator. Its variation should display a consistent pattern, with the inter-brood variance component [10]. Hematological and biochemical parameters in indigenous chickens in various regions of the world differ from each other [1,2,3,11,12]. Therefore, it is important to investigate blood profiles of indigenous birds in order to accurate interpretation of health status [12,13]. This information, beside of diagnostic and management purposes, can be use for developing new broiler strains that genetically resistant to poultry diseases [14] as well as for genetic improvement programs of industrial and indigenous poultry [3].

As shown in table 1, indigenous hens had significantly higher PCV than Ross hens. This higher quantity for indigenous hen may be in result of compatibility of these chickens for high altitude of this region (1000 to 3500m altitude). The pattern of leukocyte distribution was almost similar in indigenous and Ross broilers. Regarding to the biochemical parameters, as shown in table 1, the values for most of these parameters recorded in this study had no significantly differences between indigenous and Ross hens as well as between indigenous and Ross cocks. However, differences among values of some serum biochemical parameters have been observed between hens of indigenous and Ross-308. For example, Ross hens had a significantly higher ($P<0.05$) glucose content ($274.50\pm 33.22\text{mg/dl}$) than that of indigenous hens ($245.60\pm 28.11\text{mg/dl}$) (table1), but overall, mean values for serum glucose in this study was similar to the normal range ($200\text{-}500\text{mg/dl}$) that reported for poultry serum [15,16]. Serum cholesterol levels in hens also significantly differed between indigenous and Ross broilers (Table1). Cholesterol content in Ross hens (181.50 ± 33.22) was higher than indigenous hens (152.60 ± 28.11). This result was similar to the report by Simaraks . [1], who studied the serum cholesterol content in Thai indigenous chickens. Lower content of cholesterol in indigenous poultry may be in result of high body activity and high need of energy in these birds [17]. Low level of cholesterol in indigenous chickens can be considered with experts of poultry genetics, according to this fact that Low fat diets have been valuable in correcting inherited disorder of lipoprotein metabolism and hyperlipidemia in human beings [18].

CONCLUSION

This study revealed that the packed cell volume, glucose and cholesterol were significantly different

between indigenous and Ross 308 hens. Indigenous hens had a higher PCV and lower cholesterol and glucose than Ross 308 hens. Other haematological and biochemical parameters between indigenous and Ross308 broilers hadn't significant differences.

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