Original Research

Serum Biochemical Values and Hematological Profile of Farm Emus (*Dromaius novaehollandiae*)

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Abstract

The aim of present study is to estimate the normal values of blood parameters and to study the role of sex on serum biochemical values and haematological profile in adult emus. Investigations were carried out on 8 male and 8 female adult emu birds at private emu farm, Tirupati, Chittoor District, Andhra Pradesh, India. The experimental birds are kept under scientific management, housing and feeding practices. The serum biochemical values like total protein, cholesterol, glucose, creatinine and urea were estimated using commercial kits. There is a significant increase ($P<0.05$) in Total protein and Creatinine in females than males, while the haematological parameters viz., total RBC count, total WBC count, Haemoglobin, PCV, ESR were estimated using standard protocol, erythrocyte indices - Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH) and Mean Corpuscular Haemoglobin Concentration (MCHC) were measured. The males had significantly ($p<0.05$) higher value of total RBC count and ESR than females. Statistical analysis of the data was analyzed by one way ANOVA.

Key words: Emu (*Dromaius novaehollandiae*), Hematological Profile, Serum Biochemical Values

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Introduction

The emu (*Dromaius novaehollandiae*) is an avian species that are native to Australia and the second largest bird in the world, after the ostrich. The emus belong to ratite group (Tully and Shane, 1996). Emu farming in India is gaining commercial importance. Hence, many poultry farmers have diversified from poultry to emu farming because of its economic value (Patodkar *et al.,* 2008). They are farmed primarily for their back and abdominal fat, which is made as oil called Emu oil, that has therapeutic (Snowden and Whitehouse, 1997; Whitehouse *et al.*,1998; Lopez *et al.*, 1999; Yoganathan *et al.*, 2003; Qiu *et al.*, 2005;

Howarth *et al.*, 2008; Lindsay *et al.*, 2010; Abimosleh *et al.*, 2012) and cosmetic properties (Zemstov *et al.*, 1996). Emu meat has been shown to be low in cholesterol and fat, more tender and delicious (Satish Kumar *et al.*, 2001).

Blood profiling is a helpful tool in detecting the metabolic diseases, nutritional deficiencies, health status, and welfare of animals. Haemotological parameters are good indicators of the physiological status of the animal. Changes in haematological parameters are often used to determine various status of the body and to determine stresses due to environmental, nutritional and pathological factors (Khan and Zafar, 2005). There is very little information available on the serum biochemical values and haematological profile of adult emus. Hence, one of the objectives of the current study was to estimate the normal values of blood parameters in emus and to see the role of sex on the serum biochemical values and haematological profile in adult emus.

Materials and Methods

The present study was carried out on eight male and eight female adult Emu birds of 19 months age group. The birds were raised under semi-intensive system in an Emu farm located at Tirupati, Chittoor District of Andhra Pradesh (Fig. 1) with a night shelter and free access to outdoor space. They were fed a balanced formulated diet. Drinking water was provided *Ad libitum*.

Fig 1: Emu birds under semi intensive system of rearing

Blood samples were collected from 16 adult birds (8 males and 8 females) aged 19 months by Jugular Vein puncture (Fowler, 1991; Stewart, 1984), from right Jugular vein (Ravindra Reddy *et al*., 2003). About 5ml of blood was collected in standing position from right jugular vein of experimental birds. Sample collection was carried out aseptically by using 21 gauge needles at 9 AM.

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Hematological Parameters

Whole blood was collected for estimation of total RBC count, total WBC count, hemoglobin (Hb), packed cell volume (PCV), Erythrocyte Sedimentation Rate (ESR). Erythrocyte indices- mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were estimated. The blood was analyzed for hematological parameters like red blood corpuscles (RBC), white blood corpuscles (WBC) by Neubauer's Hemocytometer method, Hb by Sahli's haemoglobinometer method, PCV by microhematocrit method, ESR by Wintrobes method by following procedure given in standard methods as described by Schalm *et al.*, 1975.

Serum Biochemical Values

Blood samples were collected into serum separator tubes, and the serum obtained was frozen and stored at -20^{0}C for subsequent use in estimation of Serum biochemical values using commercial kits. The serum biochemical values like Total protein, Cholesterol, Glucose, Creatinine and Urea were estimated. Statistical analysis of the data was analyzed by one way ANOVA as per Snedecor and Cochran (1994).

Results and Discussion

Mean serum biochemical values of male and female emus are presented in Table 1. Total protein values and creatinine values in female were significantly ($p<0.05$) higher than males. The significant increase in total protein in female than male emus is in agreement with the findings of Menon *et al*. (2013) and Kumar *et al*. (2009) who reported increased serum total protein levels in female than male emus. Similarly, Lumeij (1987) and Harr (2005) observed significantly higher globulin values in female emus.

Table 1: Mean serum biochemical values in male and female emu birds of 19 months of age

Parameter	Male	Female
Total Protein (g/dl)	3.82 ^{a} ±0.82	4. 94 ^{b} ±0.65
Creatinine (mg/dl)	0.15 ^{a} ±0.01	0.27 ^{b} ±0.04
Glucose (mg/dl)	159.2 ^{a} ±10.4	158.7 ^{a} ±12.26
Cholesterol (mg/dl)	94.73^a ±9.6	95.24 ^{a} ±10.1
Urea (mg/dl)	9.48 ^{a} ±1.2	9.74 ^{a} ±1.1

Values in the same row bearing different superscripts differ significantly (P<0.05).

In the present study there was a significant increase in serum Creatinine values in female emus when compared to male emus which was in agreement with the findings of Menon *et al*. (2013). Creatinine in blood is derived from the breakdown of creatine in muscles and creatinine levels also varies depending on the protein levels in diet. Female emus have higher muscle mass than males (Menon *et al*., 2012), which may account for their significantly higher creatinine levels, which could be under the influence of hormones and metabolic changes, the exact reason for the difference in muscle turnover between sexes remains unclear (Menon *et al*., 2013). There is a difference between mean serum glucose, cholesterol and urea

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values in the present study in male and female emus, but the differences between sexes were not significant. Similar findings were reported by Menon *et al*. (2013) in male and female emus.

In this study the observed mean total RBC count was varied among male and female birds (Table 2) and was significantly higher in males than in female emus. The significant increase in total erythrocyte count in male emus is in agreement with the findings of Kumar *et al*. (2009) and Patodkar *et al*. (2008) in emus.

Table 2: Mean hematological parameters in male and female emu birds of 19 months of age

Parameter	Male	Female
Total RBCs ($X10^6$/µl)	2.82 [a] ±0.05	2.19 [b] ±0.08
Total WBCs ($X10^3$/µl)	14.15 [a] ±0.16	13.77 [a] ±0.24
Hb (g/dl)	16.12 [a] ±0.11	15.86 [a] ±0.16
PCV (%)	37.94 [a] ±0.21	36.34 [a] ±0.22
ESR (mm/hr)	3. 28 [a] ±0.05	3.04 [b] ±0.03
MCV (fl)	87.83 [a] ±0.23	87.53 [a] ±0.26
MCH (pg)	50.95 [a] ±0.08	50.90 [a] ±0.08
MCHC (g/dl)	38.89 [a] ±0.32	39.07 [a] ±0.28

Values in the same row bearing different superscripts differ significantly (P<0.05).

Hematological parameters for both sexes are reported in Table 2. The total leucocyte count (TLC), Hb, PCV, MCV, MCH, MCHC for both sexes reported for ratites (Fudge, 2000). There was no significant difference in these parameters in both sexes. However, males had significantly ($p<0.05$) higher value of ESR than female emus.

Conclusion

Serum biochemical values and hematological findings in emu birds were determined in both male and female birds for studying the normal values of blood parameters of emu and the effect of sex on serum biochemical and hematological parameters. It is concluded that there is a significant increase in total protein and creatinine in females than males. Total RBC count and ESR values in males are significantly higher than females.

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