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## The studies on some hematological parameters on cattle egret (*Bubulcus ibis*) in Maiduguri, Borno state Nigeria

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### Abstract

This study was carried out to establish baseline hematological values for the cattle egret in Maiduguri, Nigeria. Twenty (20) birds Cattle egret (*Bubulcus ibis*) were used for this study; they were caught during the rainy season within University of Maiduguri, Nigeria. Blood samples were collected through cardiac puncture and blood collected into the heparinized tubes and taken to the laboratory for analysis. The packed cell volume (PCV), Hemoglobin concentration (Hb), red blood cell (RBC) and differential leucocytes counts were determined. The values obtained were RBC ( $10^6/\text{mm}^3$ ) =  $2.58 \pm 0.76$ , PCV (%) =  $39.45 \pm 0.34$ , Hb g/dl =  $8.24 \pm 0.84$ , MCH (pg) =  $30.42 \pm 2.70$ , MCHC (g/dl) =  $24.14 \pm 0.32$ , MCV (fl) =  $160.00 \pm 0.60$ , heterophils (%) =  $38.62 \pm 0.21$ , Lymphocytes (%) =  $46.00 \pm 1.26$ , Basophils (%) =  $0.62 \pm 0.10$ , Monocytes (%) =  $4.20 \pm 0.10$ , Eosinophils (%) =  $3.40 \pm 0.20$  and WBC ( $\times 10^9/\text{L}$ ) =  $0.75 \pm 0.28$ . The hematological data obtained in this study can be considered preliminary reference values, which are particularly important for future research in these birds and other avian species in Maiduguri.

**Keywords:** Hematological parameters, Cattle Egret, Maiduguri, Nigeria

### Introduction

Birds generally belongs to the class of vertebrate animals called Aves. They probably evolve from some groups of arboreal reptiles related to the primitive Dinosaurs, but they have become so adapted to flying in some ways; and are now the most specialized of all craniates' class (Grove, Newell 1990) [17]. These set of animals have feathers covering their bodies which are not only concerned for flight, but also make it possible for the maintenance of high body temperature. This is also associated with the fact that they are warm blooded animal. The Cattle Egret (*Bubulcus ibis*) is a cosmopolitan species of heron (family Ardeidae) found in the tropics, subtropics and warm temperature zones (Fabbahun *et al.*, 2000) [10]. It is a stocky white bird adorned with buff plumes in the breeding season which nests in colonies, usually near bodies of water and often with other wading birds Fabbahun *et al.*, (2000) [10]. Originally native to parts of Asia, Africa and Europe, it has undergone a rapid expansion in its distribution and successfully colonized much of the rest of the world. Unlike most other herons, it feeds in relatively dry grassy habitats, often accompanying cattle or other large mammals, since it catches insect and small vertebrate prey distributed by these animals. Some population of the cattle Egret are migratory and others show post-breeding dispersal. This species removes ticks and flies from cattle, but it can be a safety hazard at airfields, and has been implicated in the spread of tick-borne animal diseases. The sexes are similar, but the male is marginally larger and has slightly longer breeding plumes than the female; juvenile birds lack colored plumes and have a black beak (Neil, 2005) [26]. The purpose of this study was to establish baseline hematological values for the cattle egret in Maiduguri, Nigeria

### Materials and Methods

#### Study area

The study was conducted in Maiduguri, Nigeria, located between latitude  $11^\circ$  and  $50^\circ$  north and longitude  $13^\circ$  and  $36^\circ$  east. The annual rainfall average 320mm, rainy season begins in June and last till October and dry season begins in November and last till May. The rainfall is monsoonal, generally been heaviest in August. The annual temperature average is  $35.4^\circ\text{C}$ , the climate of Maiduguri can be divided into six zones: Guinea, Sudano-Guinea, Sudano-sahelian, Sahelo-sudanian, Sudano-saharan and Saharan zones (LCRI, 2007) [21].

### Experimental Animals

Twenty (20) birds (Cattle egret) were used for this research; they were caught during the rainy season around the Veterinary Teaching Hospital, University of Maiduguri.

### Blood Collection

Blood samples were collected through cardiac puncture and collected into the heparinized tubes were taken to the laboratory for analysis.

### Parked Cell Volume (PCV) Determination

The parked cell volume (PCV) was determined by the use of heparinized capillary tube filled with blood  $\frac{3}{4}$  (three-quarter) of the length of the tube, the sealed tube was placed in micro hematocrit centrifuge (sigma 101m) with the sealed end outward and covered tightly. The centrifuge was switched on for five (5) minutes at the speed of 12,000 G. The hematocrit tubes then removed and placed on the hematocrit reader. The PCV were then determined in Percentage (%).

### Hemoglobin Concentration Determination

Cyamethaemaglobin method was used to determine hemoglobin concentration. 5ml pipette was used to draw 5ml of Drabkin's solution into the test-tube. 2ml of blood was also drawn into the pipette and is gently added into the tube containing the Drabkin's solution. The blood and the diluent were thoroughly mixed. Cuvette filled with Drabkin's solution served as blank control. The mixed solutions are used to fill each cuvette and are measure using calorimeter. The Hb concentrations were determined and recorded in gram percent (%) (Jain, 1986).

### Red Blood Cell Determination

The red blood cell was determined using haemocytometer method (Stoskopf *et al.*, 1986). The blood well mixed, were drawn to mark 0.5 into the RBC pipette and the tip of the pipette was cleaned using cotton wool and RBC diluting fluid was drawn into the pipette to the 101 mark. The pipette was then rolled between the thumb and the index finger to mix the content. Few drops of the content were discarded to remove the cell free fluid from the pipette. A clean slip was put on a clean improved neubeaur slide and a temporary mount made. The tip of the pipette was placed on the cover slip and the chamber was filled by capillary action. Using X 10 eye piece and X 40 objective, cells in 5 of the secondary squares each containing sixteen (16) smaller squares were counted.

The number of red blood cell (per  $\text{mm}^3$ ) was then calculated as follows:

$$N \times 10 \times 200 \times 5 = 10,000$$

N= number of red blood cells counted

10 = depth of counting chamber

200 = the dilution factor

5 = secondary square counted

### Erythrocyte Indices Determination

Having obtained the parked cell volume, the hemoglobin concentration and the red blood cell count were carried out according to the method following described by (Jain, 1986) [17].

### Determination of Differential Leucocytes Counts

The differential white cell count was determined by fixing air dried monolayer of blood for 3 minutes using Leishman/wright stain. The staining was completed by addition of a phosphate buffer (pH 6.8) and then staining for 6 minutes. Stain was washed off gently with running water, and the slide was dried and then examined in a light microscope. The white cells were classified as described by (Lucas and Jamroz, 1961) [23].

All data generated were analyzed and presented as Mean  $\pm$  SD using Graphpad InStat (2003) [16] Diego California USA statistical software.

### Results

The values of RBC, PCV, Hb, MCV, MCH, MCHC, WBC, Heterophils, Eosinophils, Basophils, Lymphocytes and Monocytes of the cattle egret are shown in Table 1. These values are for both sexes. RBC ( $10^6/\text{mm}^3$ ) value is  $2.58 \pm 0.76$ , PCV (%) is  $39.45 \pm 0.34$ , Hb g/dl is  $8.24 \pm 0.84$ , MCH (pg) is  $30.42 \pm 2.70$ , MCHC (g/dl) is  $24.14 \pm 0.32$ , MCV (fl) is  $160.00 \pm 0.60$ , heterophils (%) is  $38.62 \pm 0.21$ , Lymphocytes (%) is  $46.00 \pm 1.26$ , Basophils (%) is  $0.62 \pm 0.10$ , Monocytes (%) is  $4.20 \pm 0.10$ , Eosinophils (%) is  $3.40 \pm 0.20$  and WBC ( $\times 10^9/\text{L}$ ) is  $0.75 \pm 0.28$ . A comparison of these haematological parameters with the report by other researchers in avian species hematology is presented in Table 2.

**Table 1:** Hematological parameters of adult Cattle egret in Maiduguri.

Parameters	(Mean $\pm$ SD)
RBC( $10^6/\text{mm}^3$ )	$2.58 \pm 0.76$
PCV (%)	$39.45 \pm 0.34$
Hb g/dl	$8.24 \pm 0.84$
MCH (pg)	$30.42 \pm 2.70$
MCHC (g/dl)	$24.14 \pm 0.32$
MCV (fl)	$160.00 \pm 0.60$
Heterophils (%)	$38.62 \pm 0.21$
Lymphocytes (%)	$46.00 \pm 1.26$
Basophils (%)	$0.62 \pm 0.10$
Monocytes (%)	$4.20 \pm 0.10$
Eosinophils (%)	$3.40 \pm 0.20$
WBC ( $\times 10^9/\text{L}$ )	$0.75 \pm 0.28$

**Table 2:** A comparison of hematological parameters of cattle egret with other avian species reported by other researchers

Parameters	Cattle egret	Nigerian Duck	Nigerian Laughing Dove	Ostriches	Ring-necked Pheasant	Sharp Shinned Hawks
RBC( $10^6/\text{mm}^3$ )	$2.58 \pm 0.76$	$2.43 \pm 0.58\%$	$2.83 \pm 0.39$	$2.1 \pm 0.2$	$2.72 \pm 0.31$	NR
Hb g/dl	$8.24 \pm 0.84$	$136.10 \pm 20.40$	$151.70 \pm 22.20$	$16.68 \pm 1.08$	$15.96 \pm 1.08$	NR
PCV (%)	$39.45 \pm 0.34$	$42.58 \pm 5.67$	$43.76 \pm 7.03$	$43.25 \pm 1.9$	$43.5 \pm 1.26$	$47.6 \pm 6.73$
WBC ( $\times 10^9/\text{L}$ )	$0.75 \pm 0.28$	$16.96 \pm 2.23$	$0.72 \pm 0.27$	$5.0 \pm 1.8$	$28.53 \pm 3.37$	$12.9 \pm 7.3$
Heterophils (%)	$43.62 \pm 0.21$	NR	NR	$60 \pm 2.1$	$11.73 \pm 7.6$	$27.0 \pm 14.2$
Lymphocytes (%)	$47.38 \pm 1.26$	NR	NR	$32 \pm 2.0$	$11.92 \pm 1.75$	$63.4 \pm 14.4$
Eosinophils (%)	$3.48 \pm 0.20$	NR	NR	$1 \pm 0.2$	$1.17 \pm 0.26$	$7.67 \pm 4.18$
Basophils (%)	$1.32 \pm 0.10$	NR	NR	$6 \pm 1.4$	$2.47 \pm 1.24$	$0.40 \pm 0.79$
Monocytes (%)	$4.20 \pm 0.10$	NR	NR	$1 \pm 0.5$	$2.05 \pm 1.22$	$1.60 \pm 1.99$
MCV (fl)	$160.0 \pm 0.60$	$183.06 \pm 28.95$	$156.77 \pm 31.50$	$205.95 \pm 15$	NR	NR
MCHC (g/dl)	$24.14 \pm 0.32$	$31.51 \pm 1.09$	$35.18 \pm 4.94$	$38.56 \pm 2.0$	NR	NR
MCH (pg)	$30.42 \pm 2.70$	$57.64 \pm 0.04$	$54.41 \pm 10.93$	$79.42 \pm 12$	NR	NR

## Discussion

Normal hematological values for avian species determined by different laboratories can vary significantly. This variation can be caused by differences in blood sampling and analytical techniques; for instance reference ranges for avian RBC vary significantly among reports of many authors (Campbell, 2000; Fudge, 2000) <sup>[5, 13]</sup>. The results found in this study, indicate the importance of evaluating factors that may influence the hematologic results such as age, gender, physiological status and laboratory methodology. The present study reveals that the erythrocytic and leucocytic values obtained for the cattle egret are comparable with the reports by other earlier studies in other species of birds such as captive water fowl and the black duck (Mulley, 1979); the wood duck (Mulley, 1986); pigeon and peafowl (Campbell, 2000) <sup>[5]</sup>; and the Nigerian duck (Campbell, 2000) <sup>[5]</sup>, in which no sex differences were observed in their erythrocytic values. However, the findings in this study is in contrast with the reports by (March *et al.*, 1966) <sup>[25]</sup> in domestic fowl, (Campbell, 2000) <sup>[5]</sup>, in guinea fowl, in the pecking duck and in the Japanese quail (Hunsaker *et al.*, 1964) <sup>[19]</sup> in which higher erythrocytic values were reported in the males than in the females. They attributed their findings to the male sex hormone testosterone which has been implicated to be responsible for the higher erythrocyte levels in the male Fried *et al.* (1964) <sup>[12]</sup>. It would be seen that testosterone play an insignificant role in the erythropoiesis of the cattle egret. The cattle egret in the present study showed lower values in the erythrocytic indices (MCV, MCHC and MCH) as compared to the reports by (Campbell, 2000) <sup>[5]</sup> who reported higher values in both the Nigerian laughing dove and the Nigerian duck.

In this study, the total WBC value of  $0.75 \times 10^9/L$  observed in the cattle egret is comparable with the value of  $0.72 \times 10^9/L$  observed in the Nigerian laughing dove, though in contrast with  $16.93 \times 10^9/L$  of the Nigerian duck (Campbell, 2000) <sup>[5]</sup>,  $3.61 \times 10^9/L$  (Mulley, 1982),  $6.85 \times 10^9/L$  (Olayemi *et al.*, 2002) in the same species of duck respectively. The WBC values in this study was also lower than that reported in the black duck ( $19.93 \times 10^9/L$ ) (Mulley, 1982) and wood ducks ( $23.63 \times 10^9/L$ ) (Mulley, 1980).

Heterophils are the most abundant of the leucocytes in the peripheral blood of most species of birds in most studies. Whereas some avian species are lymphocytic (have lymphocytes as the predominant cell type in the differential count) (Fudge, 2000; Latimer and Bienzle, 2000) <sup>[13, 22]</sup>. The cattle egrets in the study had lymphocytes as the most abundant leucocytes in the peripheral blood. Hematological studies of wild turkeys showed a similar condition (Bounous *et al.*, 2000) <sup>[3]</sup> and according to Bounous and Stedman (2000) <sup>[4]</sup> the lymphocytes are the leucocytes in the peripheral blood of chickens and turkeys.

In conclusion, some hematologic parameters showed significant differences between species, the hematologic data obtained in this study can be considered preliminary reference values, which are particularly important for future research in this and other avian species in Maiduguri.

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