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A William

Department of Veterinary
Physiology and Biochemistry,
University of Maiduguri, Nigeria

M Zakariah

Department of Veterinary
Anatomy, University of
Maiduguri, Nigeria

VA Maina

Department of Veterinary
Theriogenology, University of
Maiduguri, Nigeria.

A Othman

Department of Veterinary
Physiology and Biochemistry,
University of Maiduguri, Nigeria

M Chiroma

Department of Veterinary
Physiology and Biochemistry,
University of Maiduguri, Nigeria

KA Sanda

Department of Veterinary
Physiology and Biochemistry,
University of Maiduguri, Nigeria

Correspondence

M Zakariah

Department of Veterinary
Anatomy, University of
Maiduguri, Nigeria

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

A William, M Zakariah, VA Maina, A Othman, M Chiroma and KA Sanda

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 ± 0.76 , PCV (%) = 39.45 ± 0.34 , Hb g/dl = 8.24 ± 0.84 , MCH (pg) = 30.42 ± 2.70 , MCHC (g/dl) = 24.14 ± 0.32 , MCV (fl) = 160.00 ± 0.60 , heterophils (%) = 38.62 ± 0.21 , Lymphocytes (%) = 46.00 ± 1.26 , Basophils (%) = 0.62 ± 0.10 , Monocytes (%) = 4.20 ± 0.10 , Eosinophils (%) = 3.40 ± 0.20 and WBC ($\times 10^9/\text{L}$) = 0.75 ± 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° and 50° north and longitude 13° and 36° 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°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 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 ± 0.76 , PCV (%) is 39.45 ± 0.34 , Hb g/dl is 8.24 ± 0.84 , MCH (pg) is 30.42 ± 2.70 , MCHC (g/dl) is 24.14 ± 0.32 , MCV (fl) is 160.00 ± 0.60 , heterophils (%) is 38.62 ± 0.21 , Lymphocytes (%) is 46.00 ± 1.26 , Basophils (%) is 0.62 ± 0.10 , Monocytes (%) is 4.20 ± 0.10 , Eosinophils (%) is 3.40 ± 0.20 and WBC ($\times 10^9/\text{L}$) is 0.75 ± 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 ± 0.76
PCV (%)	39.45 ± 0.34
Hb g/dl	8.24 ± 0.84
MCH (pg)	30.42 ± 2.70
MCHC (g/dl)	24.14 ± 0.32
MCV (fl)	160.00 ± 0.60
Heterophils (%)	38.62 ± 0.21
Lymphocytes (%)	46.00 ± 1.26
Basophils (%)	0.62 ± 0.10
Monocytes (%)	4.20 ± 0.10
Eosinophils (%)	3.40 ± 0.20
WBC ($\times 10^9/\text{L}$)	0.75 ± 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 ± 0.76	$2.43 \pm 0.58\%$	2.83 ± 0.39	2.1 ± 0.2	2.72 ± 0.31	NR
Hb g/dl	8.24 ± 0.84	136.10 ± 20.40	151.70 ± 22.20	16.68 ± 1.08	15.96 ± 1.08	NR
PCV (%)	39.45 ± 0.34	42.58 ± 5.67	43.76 ± 7.03	43.25 ± 1.9	43.5 ± 1.26	47.6 ± 6.73
WBC ($\times 10^9/\text{L}$)	0.75 ± 0.28	16.96 ± 2.23	0.72 ± 0.27	5.0 ± 1.8	28.53 ± 3.37	12.9 ± 7.3
Heterophils (%)	43.62 ± 0.21	NR	NR	60 ± 2.1	11.73 ± 7.6	27.0 ± 14.2
Lymphocytes (%)	47.38 ± 1.26	NR	NR	32 ± 2.0	11.92 ± 1.75	63.4 ± 14.4
Eosinophils (%)	3.48 ± 0.20	NR	NR	1 ± 0.2	1.17 ± 0.26	7.67 ± 4.18
Basophils (%)	1.32 ± 0.10	NR	NR	6 ± 1.4	2.47 ± 1.24	0.40 ± 0.79
Monocytes (%)	4.20 ± 0.10	NR	NR	1 ± 0.5	2.05 ± 1.22	1.60 ± 1.99
MCV (fl)	160.0 ± 0.60	183.06 ± 28.95	156.77 ± 31.50	205.95 ± 15	NR	NR
MCHC (g/dl)	24.14 ± 0.32	31.51 ± 1.09	35.18 ± 4.94	38.56 ± 2.0	NR	NR
MCH (pg)	30.42 ± 2.70	57.64 ± 0.04	54.41 ± 10.93	79.42 ± 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) ^[5, 13]. 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) ^[5]; and the Nigerian duck (Campbell, 2000) ^[5], 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) ^[25] in domestic fowl, (Campbell, 2000) ^[5], in guinea fowl, in the pecking duck and in the Japanese quail (Hunsaker *et al.*, 1964) ^[19] 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) ^[12]. 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) ^[5] 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) ^[5], $3.61 \times 10^9/L$ (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) ^[13, 22]. 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) ^[3] and according to Bounous and Stedman (2000) ^[4] 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.

References

- Bell DJ, Freeman BM. Physiology and Bio-chemistry of the domestic fowl. 1971; (2):841.
- Botkin DB. The naturalness of biological invasions. Western North American Naturalist. 2001; 61(3):261-266.
- Bounous DI, Wyatt RD, Gibss PS, Kilburn JV, Quist CF.

- Normal hematological and serum biochemical reference interval for juvenile wild turkeys. Journal of Wildlife Diseases. 2000; 36:393-396.
- Bousnous DJ, Stedman NL. Normal avian hematology: chicken and turkey. In: Feldman, B.F., Zlnki, J.G and N.C. Jain. Schalm's Veterinary Hematology, 5th Ed. Lippincott, Williams and Wilkison, Philadelphia. 2000, 1147-1154.
- Campbell TW, Coles EH. Avian hematology and blood chemistry in: Veterinary pathology, ed. Coles EH, 4th ed. WB Saunders, Philadelphia, PA, 2000, 279-301.
- Cattle Egret. All about birds. Cornell Laboratory of Ornithology. http://www.birds.cornell.edu/AllaboutBirds/BirdGuide/Cattle_Egret_dtl.html. Retrieved 2008-02-28.
- Dobsinka O, Donsinka E. Seasonal changes in the blood picture of Adult pheasants. Central Bull Vet. EDn. 1976; (B):23:609.
- Elizabeth Moreira dos Santos Schmidt, Antonio Carlos Paulillo, Gislaine Regina Viera Martins, Ivan Moura Lapera, Alan Jonathan Pereira Testi, Leonildo Nardi Junior *et al.* Hematology of the Bronze Turkey (*Meleagris gallopavo*): Variations with Age and Gender. International Journal of Poultry Science. 2009; 8(8):752-754.
- Enberys H. Fine structure of the leucocytes of poultry; Electron microscope studies on the blood leucocytes. Advantages in veterinary medicine 100inst. Anat. Physio. Hygiene uni. Bonn, 1975, 22.
- Fabbohun AO, Owoade AA, Oluwayelu DO, Olayemi FO. Serological survey of infectious bursal disease virus antibodies in cattle egret, pigeons and Nigerian Laughing doves. African Journal of Biomedical Research. 2000; 3(3):191-192. <http://www.bioline.org.br/request?md00053>
- Fogarty Michael, Hetrick J, Willa M. Summer Foods of Cattle Egrets in North Central Florida. The Auk. 1973; 90(2):268-280.
- Fried WR, Degowin R, Forde CN, Gurney. The erythropoietic effect of androgens. J. Lab. Clin. Med. 1964; 64:858-859.
- Fudge AM. Laboratory Medicine-Avian and Exotic Pets. W.B. Saunders Company, Philadelphia. 2000, 486.
- Funsho O, Olayemi Ernest, Ojo O, Olusegun A, Fagbohun. Haematological and plasma biochemical parameters of the Nigerian laughing dove (*Streptopelia senegalensis*) and the Nigerian duck (*Anas platyrhynchos*) Veterinarski Arhiv. 2006; 78(2):145-151.
- Gilbert AB. Variations in Avian Haematology. Rev. Vet. Sci. 1965; 6:114-116.
- Graphpad Instat. Graphpad instat version 3.0 for Windows 95, graphpad software, San Diego California USA, 2003. www.graphpad.com
- Grove AJ, Newell GE. Animal biology, 7th ed. Unwin Hyman London, 1990.
- Grubb T. Adaptiveness of Foraging in the cattle egret. Wilson Bulletin. 1976; 88(1):145-148.
- Hunsaker WG, Hunt JR, Aitken JR. Physiology of the growing and adult goose. 1 Physical characteristics of blood. Br. Poult. Sci. 1964; 5:257-262.
- Jain J. Hematologic techniques. In: Schalm's Veterinary haematology, ed Jain NC 4th ed. Lea & Febieger, Philadelphia, P.A, 1986, 20-86.

21. Lake Chad Research Institute (LCRI) (). Annual Weather Report, IFAD-TAG, 2007; 718:28.
22. Latimer KS, Bienzle D. Determination and interpretation of the avian leukogram 0. In: Feldman, B.F.; Zinkl, J.G. and Jain N.C. Schalm's Veterinary Haematology, 5th Ed. Lippincott, Williams and Wilkins, Philadelphia. 2000, 417-432.
23. Lukas AM, Jamroz C. Atlas of Avian Haematology. U.S: Department of Agriculture, Washington. 1961, 120-126.
24. Malcoms Gornd. Animal physiology principles and adaptations. 3rd ed. Macmillan, 1977, 34-448.
25. March BE, Coates V, Biely J. The effect of oestrogen and androgen on osmotic fragility and fatty acid composition on erythrocytes in the chicken. Can. J. Physiol. Pharm. 1966; 44:379-387.
26. Mckilligan Neil. Herons, Egrets and Bitterns: Their Biology and Conservation in Australia. CSIRO Publishing. 2005, 88-93. ISBN 0-643-09133-5.
27. Mulley RC. Haematology and blood chemistry of the black duck (*Anas superciliosa*) J. WildL. Dis. 1979; 15:437-441.
28. Mulley RC. Hematology of the wood duck (*Chenonetta jubata*) J. WildL. Dis. 1986; 16:271-273.
29. Mushi EZ, Binta MG, Chabo RG, Isa JFW, Kapaata RW. Selected hematologic values of farmed ostriches (*Struthio camelus*) in Botswana. J Vet Diagn Invest. 1999; 11:372-374.
30. Paton P, Fellows D, Tomich P. Distribution of cattle Egret Roost in Hawaii with Notes on the problems Egrets pose to Airports. Elepaio. 1986; 46(13):143-147.
31. Seedikkoya K, Azeez PA, Abdul Shukkur. Cattle Egret as a biocontrol agent (PDF) Zoos' print Journal. 2007; 22(10)2864-2866.
<http://www.zoosprint.org/zoosprintjournal/2007/october/2864-2866.pdf>
32. Siegfried WR. The Food Chain of the Cattle Egret. Ecology (British Ecological Society) 1971; 8(2):447-468
doi:10.2307/2402882.JSTOR2402882.
33. Stoskopf MJ, Neely E. An introduction to Avian Hematology for Veterinary Technician poc. Assoc. Zoo. Vet. Tech. 1986, 85-93.
34. Stoskopf MK, Nelley E, Mangold B. Avian Hematology in clinical practice. Part 1. Mod Vet Pract. 1983; 64:629-632.
35. Telfair H, Raymond C. Cattle Egret (*Bubulcus ibis*), the birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from The birds of North America, 2006. Online doi:10.2173/bna.113
36. Woerpel RW, Rosskopf WJ. Clinical experience with avian laboratory diagnostics. Vet Clin Am Small Anim Pract. 1984; 14:249-272.