

**SHORT COMMUNICATION:  
NORMAL CONCENTRATIONS OF SOME BLOOD CONSTITUENTS IN  
OSTRICH (*STRUTHIO CAMELUS*)**

**By:**

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**KEYWORDS:** Ostrich, haematology and serum chemistry.

**ABSTRACT**

The concentrations of some haematologic and blood chemical constituents were determined in 7 adult ostrich (*Struthio camelus*). The mean values are as follows: haemoglobin (83.4 ± 4.3%), packed cell volume (43.6 ± 3.7%), red blood cell count (18.16 ± 9.2 × 10<sup>6</sup>), erythrocyte sedimentation rate (2.1 ± 0.8 mm/h), glucose (206 ± 17 mg/dl), total protein (3.46 ± 0.6 g/dl), albumin (1.9 ± 0.3 g/dl), creatinine (0.4 ± 0.06 mg/dl), uric acid (6.3 ± 1.1 mg/dl), inorganic phosphate (5.8 ± 0.2 mg/dl), sodium (342.0 ± 42.1 mg/dl), potassium (12.13 ± 1.2 mg/dl), magnesium (2.16 ± 0.36 mg/dl) and copper (1.2 ± 0.22 mg/dl).

**المخلص:**

في هذه الدراسة تم قياس بعض مكونات الدم ومكوناته الكيميائية لعدد سبعة طيور من النعام البالغ. وكان متوسط خضاب الدم 83.4 ± 4.3%، وحجم خلايا الدم المرصوفة 43.6 ± 3.7%، وعدد كريات الدم الحمراء 18.16 ± 9.2 × 10<sup>6</sup>، ومعدل ترسيب الدم 2.1 ± 0.8 mm/h وتركيز الجلوكوز في الدم 206.0 ± 17 mg/dL والبروتين الكلي 3.46 ± 0.6 g/dL والألبومين 1.9 ± 0.3 g/dL، والكرياتينين 0.4 ± 0.06 mg/dL، وحمض اليوريك 6.3 ± 1.1 mg/dL، والفسفور غير العضوي 5.8 ± 0.2 mg/dL، والصوديوم 342.01 ± 42.1 mg/dL، والبوتاسيوم 12.13 ± 1.2 mg/dL، والمغنسيوم 2.16 ± 0.36 mg/dL، والنحاس 1.2 ± 0.22 mg/dL.

## INTRODUCTION

Almost all birds fly except a group of flightless bird called ratites. They are characterized by beautiful feather and absence of the keel of the sternum. They are not closely related, they include: the Kiwi of New Zealand, Rea of South Africa, Emus and Cassowary of Australia and Ostrich of Africa (Brown *et al.*, 1982).

Ostrich (*Struthio camelus*) is the largest among living birds. Adult male is nearly 240 cm high, and over 122 kg body weight, the body plumage is black and wings and tail are white. The head, neck, and legs are bare feather, the colour of the neck and legs varies from pink to bluish grey depending upon the race. The female is somewhat smaller compared to the male. The male has grayish brown body, wings, and tail. The presence of very prominent thick black eye lashes, two inches across, is a characteristic feature of the bird.

Distribution of ostrich in Sudan was described by Nikolaus (1987), in Dindir National Park, Blue Nile, Southern Kordofan and Darfur, Upper Nile, Eastern Equatoria and North Western Bahr Elghazal. In 1992, the Wild Life Authority estimated that the ostrich population of the Sudan is not less than 10 000 birds.

Despite the increase in the number of domestic ostrich, the traders found that the feather of the wild ostrich is the best. However, better nutrition and management as well as selective breeding have improved the quality of feather of the domesticated ostrich over that of the wild ones.

Ostrich meat has received increasing attention and become popular throughout the world because of its favorable fatty acid profile and low intra-muscular fat content (Sales, 1995).

Haematological indices and blood biochemical parameters have been used for many years in veterinary medicine as a tool in the evaluation of the health status of sick birds. Although these parameters have been studied and reported as reference values by (Olowookorun and Makinde 1998, Lien and Lu 1998, Levy *et. al.*, 1989, Palomeque *et. al.*, 1991 and Aisha 2001), basic information regarding Sudanese ostrich is necessary. The present work was conducted to investigate some haematological and blood biochemical values for Sudanese ostrich.

## **MATERIALS AND METHODS**

Seven adult (5 males and 2 females) ostriches (*Struthio camelus*) were reared in the farm of the College of Veterinary Medicine and Animal Production, Sudan University for Science and Technology, and used in this study. The birds were housed in pens built in East/West direction partially roofed with corrugated metal sheets and the floor was covered with coarse sand. The birds were fed on ground sorghum and salt. Fresh drinking water was available *ad libitum*.

The blood was collected, using heparinized vacutainers, from the right jugular vein as many species of birds have no left jugular vein or only small one (Emberth and Saunders, 1986). About (4 ml) of blood was used for haematological analysis, immediately left to clot. The other part of the sample (5 ml) was centrifuged and serum was used for determination of the biochemical values.

Haematological analysis included determination of haemoglobin (Hb) concentration, packed cell volume (PCV), red blood cells (RBC) count, and erythrocyte sedimentation rate (ESR) and total white blood cell (WBC) count. Haemoglobin concentration was measured by adding 10 µl of well-mixed whole blood to 5 ml of Drabkin's reagent. After 10 minutes the mixture was centrifuged at 2500 rpm for 5 minutes in order to avoid interference of the lysed nuclei during the determination of the optical density which was measured in the spectrophotometer at 540 nm. The other haematological parameters were determined according to the methods described for avian blood (Lucas and Jamroz, 1961).

Glucose, creatinine, total protein, albumin and uric acid concentrations were determined using commercial Kits (Plasmatic Laboratory Products, Ltd, England).

Inorganic phosphorus of the blood serum was determined using the method described by Taussky and Shorr (1953). Sodium and potassium levels in blood serum were determined by flame photometry (Varley, 1986). Changes in the flame photometer readings were recorded and values estimated in mEq/l. were then converted to mg/dl.

Atomic absorption spectrophotometer (Perkin Elmer A.A.S model 3110, 1993, single beam, Brigham Weller, Germany) was used for the

measurement of magnesium and copper concentrations according to the method described by (Valoon 1980).

**RESULTS AND DISCUSSION**

In the present study, the values of the haematological parameters (Table 1) are in agreement with that reported by (Levy *et al.*, 1989), (Palomeque *et al.*, 1991) and (Olowookorun and Makinde 1998), but are higher than those reported for juvenile ostrich in Sudan (Aisha, 2001). The increase in haemoglobin concentration could be due to the changes in blood volume per unit of body weight (Nirmalan and Robinson, 1971). The age-related haemoglobin difference seems to be characteristic of most avian species (Gessaman *et. al.*, 1986). The high values for red blood cell (R.B.C.) count, packed cell volume (P.C.V.) and haemoglobin (Hb) concentration might indicate that the flightless ostrich has a high oxygen carrying capacity, which enables these birds to run at speeds comparable to other fast animals (Palomeque *et. al.*, 1991).

The concentrations of glucose, total protein, albumin, creatinine, and uric acid are shown in (Table 2). In general, the values of these parameters were found to be within the reported by (Palomeque *et. al.*, 1991, Levy *et al.*, 1989, Okotie-Eboh *et. al.*, 1992, Lien and Lu 1998 and Aisha 2001). However, the relatively low values of uric acid obtained in this study might be due to dietary effect. Since birds are uricotelic and produce uric acid as the major nitrogenous end product of metabolism, urea nitrogen is not a useful renal function test in birds (Lewandowski *et. al.*, 1986).

**Table (1): Normal Haematologic Values for Ostrich**

<i>Parameter</i>	<i>Unit</i>	<i>Mean+SD</i>	<i>Range</i>
Haemoglobin (Hb)	%	83.4+4.3	80-92
Packed cell volume (PCV)	%	43.6+3.7	40-48
Red blood cell count (RBC)	X10 <sup>6</sup>	18.16 +9.2	16.0-20.2
Erythrocyte sedimentation rate(ESR)	mm/h	2.1±0.8	1-3

**Table (2): Normal Blood Biochemical Values for Ostrich**

<i>Parameter</i>	<i>Unit</i>	<i>Mean±SD</i>	<i>Range</i>
Glucose	mg/dl	206±17	193-230
Total protein	g/dl	3.46±0.6	2.58-4.7
Albumin	g/dl	1.9±0.3	0.98-3.1
Creatinine	mg/dl	0.4±0.06	0.3-0.52
Uric acid	mg/dl	6.3±1.1	4.8-7.2
Inorganic phosphate	mg/dl	5.8±0.2	5.5-6.2
Sodium	mg/dl	342.0±42.1	293.9-395.1
Potassium	mg/dl	12.13±1.2	10.5-13.2
Magnesium	mg/dl	2.16±0.36	2.0-2.6
Copper	mg/dl	1.2±0.22	0.9-1.4

The inorganic phosphate, sodium, potassium, magnesium and copper levels in this study were also found to be similar to those previously obtained by (Okotie-Eboh *et. al.*, 1992, Palomeque *et. al.*, 1991 and Bezuidenhout *et. al.*, 1994).

It is important to standardize analytical procedures utilized for haematological and biochemical studies in ostrich in order to make future data truly comparable.

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