

*Full Length Research Paper*

## Seasonal variation effects on the composition of blood in Nubian ibex (*Capra nubiana*) in Saudi Arabia

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The aim of this study was to investigate the effect of seasonal variation on the haematological and biochemical parameters in adult captive wild male Nubian ibex (*Capra nubiana*), a group of 20 Nubian ibex was selected for the study. Haemoglobin (Hb), glucose concentration (Glu), blood urea nitrogen (BUN), total proteins (TP), albumin (Alb), globulin (Glob), calcium (Ca), magnesium (Mg) and phosphorous (P) were studied. However, haemoglobin, glucose concentration, total plasma protein were higher during summer season, while BUN, albumin and globulin were higher in rainy season. On the other hand, calcium, magnesium, phosphorous did not show any significant alteration.

**Key words:** Ibex, blood, haemoglobin, blood urea nitrogen (BUN), total plasma protein, albumin, globulin, calcium, phosphorus.

### INTRODUCTION

Ibex species is found east of the Nile in Egypt, north-east Sudan, Northern Ethiopia, Western Eritrea, West Jordan, scattered locations in Western and Central Saudi Arabia, scattered locations in Yemen and in Southern Oman (Grubb, 2005). It is extinct in Lebanon and Syria.

In Saudi Arabia, few systematic tallies have been made. Most of the information (data) was gotten from brief aerial and ground exploration survey made to locate populations. Among the 15 sites where ibex has been found, major concentrations are observed in the western mountains of the Arabian shield with isolated populations located in the north, north-central and central regions. Only little observations have been made in the south. The

higher densities appear to be in Jabal Qaraqar, Hemah Fiqrah and the Ibex Reserve at Hawtat bani Tamim (Habibi and Tatwany, 1997).

In Saudi Arabia, there is no accurate population estimation, but the overall numbers are believed to be decreasing in the area where ibex species is not protected. In contrast, ibex populations are believed to be increasing in the two protected areas where estimations are satisfying and females appear to give birth to twins frequently as reported by Habibi and Tatwany (1997). In the Hawtat bani Tamim Ibex Reserve, the most recent data were recorded for 400 individuals (Robinson et al., 2003). Habitat loss and degradation are threatening the species and its range. In Saudi Arabia, Nubian Ibex continues to be threatened by habitat degradation, particularly through the extension of roads, livestock encroachment and other developmental pressures on its remaining refuges (Catullo et al., 1996; Habibi and Tatwany, 1997). Bedouins access to isolated regions where ibex is observed, results in threat of the habitat and water resources of

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**Abbreviations:** Hb: Haemoglobin; Glu: glucose; BUN: blood urea nitrogen; TP: total proteins; Alb: albumin; Glob: globulin; Ca: calcium; Mg: magnesium; P: phosphorous.

**Table 1.** Influence of season on the studied serum variables of Ibex (*Capra nubiana*) in Saudi Arabia (means  $\pm$  standard error). Same letters in the rows are not statistically different at 5% level of significant by LSD (least significant difference). Replicates, N = 20.

S/N	Parameter	Season		
		Winter (8 - 25°C)	Summer (35 - 45°C)	Rainy (25 - 35°C)
1	Haemoglobin (g/dl)	15.1 $\pm$ 4.5	15.8 $\pm$ 2.3	14.9 $\pm$ 0.35
2	Glucose (mg/dl)	125.25 <sup>b</sup> $\pm$ 0.35	126.1 <sup>b</sup> $\pm$ 0.66	86.2 <sup>a</sup> $\pm$ 0.25
3	BUN (mg/dl)	12.08 <sup>b</sup> $\pm$ 0.22	12.08 <sup>b</sup> $\pm$ 0.35	11.98 <sup>a</sup> $\pm$ 0.35
4	Total protein (g/dl)	10.41 <sup>a</sup> $\pm$ 0.25	10.56 <sup>b</sup> $\pm$ 0.24	10.22 <sup>a</sup> $\pm$ 0.22
5	Albumin (g/dl)	4.78 <sup>b</sup> $\pm$ 0.62	4.75 <sup>b</sup> $\pm$ 0.78	4.93 <sup>a</sup> $\pm$ 0.58
6	Globulin(g/dl)	3.60 <sup>b</sup> $\pm$ 0.26	3.8 <sup>9b</sup> $\pm$ 0.23	4.14 <sup>a</sup> $\pm$ 0.24
7	Calcium (mg/dl)	10.30 $\pm$ 0.31	10.4 $\pm$ 0.2	10.35 $\pm$ 0.30
8	Magnesium (mg/dl)	3.03 $\pm$ 0.5	3.0 $\pm$ 0.8	2.99 $\pm$ 0.24
9	Phosphorus (mg/dl)	6.87 $\pm$ 3.1	6.9 $\pm$ 2.8	6.99 $\pm$ 2.81

<sup>a,b</sup>Significant differences ( $P < 0.05$ ) between the values during: a, rainy season; b, both winter and summer which were not significantly different from each other. BUN, Blood urea nitrogen.

secured populations.

Little information is found regarding the hematological parameters of Ibex species (Perez et al., 2003). However few reports on biochemical baseline information for the genus *Capra* is available, none is available for the species *Capra nubiana*. Perez et al. (2003) studied the haematological parameters of the Spanish Ibex.

Blood chemistry is a vital diagnostic aid; therefore, it is essential that its application should be based on firm scientific foundations. Information of blood biochemistry of Ibex under different climatic conditions in village areas is very scanty.

The aim of this study was to collect and evaluate selected biochemical and hematological parameters of captive *C. nubiana* Ibex under the effect of seasonal variation in Saudi Arabia.

## MATERIALS AND METHODS

The animals (captive adult wild male three to five years old) used in this study were 20 adult male clinically normal and healthy Ibex (*C. nubiana*) weighing 40 to 50 kg. The animals were kept at King Khalid Wildlife Research Center near Riyadh, Saudi Arabia. The animals were fed on a ration of dried lucerne and commercial concentrate (crude protein 16%), with free access to water. All adult males were routinely vaccinated against infectious diseases and given coccidiostats and anthelmintic drenches as necessary. The entire experiment was split in three phases including phase I: winter season, phase II: summer season and phase III: rainy season (the spring). In the three seasons, all animals used in the experiment were the same.

Blood samples (10 ml), were collected from each ibex by jugular vein puncture into clean vacuum tubes (Becton, Dickinson and Co., USA) containing EDTA-K<sub>2</sub>, while the animal was manually restrained. Each tube was inverted two to three times to ensure thorough mixing. The samples were analyzed within 2 h in the laboratory using an automated hematology analyzer (VetScan HM2; Abaxis Veterinary Diagnostics). Each sample was analyzed for red blood cell (RBC) and hemoglobin (Hb), by Counter Model

ZM (Coulter Electronics Ltd., Luton, Bedford shire, United Kingdom).

All samples were evaluated on the same day. Blood samples for biochemical analyses were centrifuged at 3,000 rpm for 10 min, and the serum was decanted. Then, the biochemical parameters were obtained using the biochemistry analyser VetScan VS2 (Abaxis Veterinary Diagnostics, Union City, CA 94587, USA).

The rotor used for biochemical investigations was the comprehensive profile (Abaxis, USA). It was used to analyze albumin, blood urea nitrogen (BUN), calcium (Ca), phosphorus (P), glucose (GLU), total plasma protein (TP) and globulin (Glob). These parameters would give such a good indication about the liver function, kidney function, carbohydrate and protein metabolism and electrolytes. Only 100  $\mu$ l of the serum from each samples was sufficient to test all parameters. The results are obtained within 10 to 15 min for each rotor.

## Statistical analysis

Each treatment was composed of 20 replicates ( $n = 20$ ). Standard error (SE) was calculated for each parameter. The statistical analysis was followed by least significant difference (LSD) test.

## RESULTS AND DISCUSSION

The seasonal effect on the composition of blood in *Nubian ibex* is shown in Table 1. The higher average of haemoglobin concentration (15.8 g/dl) was recorded during summer season. However, there was no significant difference in haemoglobin concentration for rainy and winter season. This may be referred to the effects of stress on this parameter as described by Peinado et al. (1995).

GLU concentration was higher in summer (126.1 mg/dl), whereas it was lower (86.20 mg/dl) during rainy season. Change in glucose concentration may be associated with change in the plasma concentration of blood and also collection sites can provide different measured glucose

concentrations (Kuwa et al., 2001).

BUN is related to protein and energy intake (Kirkpatrick, 1975; Bahnak et al., 1979; Seal, 1979). In general, BUN is directly related to protein intake when energy consumption is constant and above maintenance.

However, high levels of energy in the diet can depress BUN, while low levels of energy may cause its increase (Kirkpatrick, 1975; Warren et al., 1981). In this study, there were no significant differences during summer and winter seasons, but it was significantly low during rainy season (11.98 mg/ dl). TP concentration during summer season was higher (10.56 g/dl) as compared to others season. Moreover, there was no variation in concentration of TP at other different season. It is similar to the study reported by Averos et al. (2007).

Albumin concentration was the lowest (4.75 g/dl) during summer season and there was no significant difference between summer and winter season. Whereas, higher concentration was found in rainy season (4.93 g/dl) as compared to others season. This finding is compatible with the role of albumin in maintaining plasma osmotic pressure and transportation of protein in the blood. Pratt (1996) and Suntorn et al. (2009) also reported in their previous studies and revealed reduction in albumin level in goats (Okab et al., 1993) and sheep (Payne., 1990) during summer. The difference in the globulin may be due to the various physiological adaptation and genetic factors. Abdalla et al. (2009) reported that higher plasma globulin level was observed during rainy season (4.14 mg/dl) with significant differences for both winter (3.60 g/dl) and summer (3.89 g/dl) seasons. It may suggest that the goats are more adapted to the arid environment so that their immunity is potentiated. Calcium and phosphorus are usually discussed together because they occur in most part body combined with each other and an inadequate supply of either of them is due to limitation of the nutritive value of both. In this study, calcium concentration did not differ significantly during winter (10.3 mg/dl) and rainy season (10.35 mg/dl). Nevertheless, calcium (Ca) was found to be higher in summer season (10.6 mg/dl) as compared to others season. This result is identical to previous study carried out by Aleissa (2011). Phosphorus and magnesium did not show any significant difference for all seasons, it is in line with the study of Sandabe et al. (2000).

## Conclusion

This work obtained a basic data concerning the biochemical changes in blood values of the Ibex (*C. nubiana*) in Saudi Arabia. Rainfall seems to have a higher effect on blood parameters (and thus, on health) than temperature variation in this species. In addition to this, the changes in blood values during different seasons

were measured and knowledge regarding the protection of this endangered species was acquired.

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