

COMPARISON OF SOME BLOOD CONSTITUENTS IN STABLED AND GRAZING CAMELS (*CAMELUS DROMEDARIUS*) IN SUDAN

By

S.M. Barakat¹, I.Y. Turkey¹, S. M. El Bashir², S. A. Ali¹ and S. A. Omer¹

1- College of Veterinary Medicine and Animal Production, Sudan University of Science and Technology, Kuku, P O Box 204, Khartoum North, 2- Department of Biochemistry and Nutrition, Animal Health Research Corporation, Khartoum, Sudan.

ABSTRACT

The concentrations of some blood constituents are determined in a group of 12stabled and 12naturally grazing camels (*Camelus dromedarius*). A highly significant variation ($P<0.01$) is observed in haemoglobin (Hb) concentration, packed cell volume (PCV), mean corpuscular haemoglobin concentration (MCHC), mean cell volume (MCV) and total white blood cell (WBC) count, in the blood the two groups. No variation is observed in values of erythrocytes count (RBC) or erythrocytes sedimentation rate (ESR).

The grazing group of camels have shown higher serum concentration of magnesium (Mg) and potassium (K) ($P<0.01$) than the stabled group. The differences in serum concentration of sodium (Na), calcium (Ca) and inorganic phosphorus (P) between the two groups are not statistically significant.

The values obtained in this study are compared with those reported by camel workers in other localities.

INTRODUCTION

In Sudan, camel breeds are classified into pack and riding camels (Babiker, 2000). The camel population in Sudan is estimated at 3.3millions (Anon, 2004). Several studies have shown that camels are a good source of milk and they constitute the most important source of meat in arid areas (Knoess, 1977; Farah *et al.*, 1992). Raising food animals with low price meat such as camels is one way of bridging the gap between the demand for meat and the poor purchasing power (FAO, 1995). The methods of camel keeping are now fast changing due to the shrinkage of grazing land (Mokhtar *et al.*, 1998). Investigations determining normal values of blood constituents in camel are limited and the way they are affected by age, sex, breed, season, nutritional

status and other factors seem to be limited (Hassan *et al.*, 1968; Abdel Gadir *et al.*, 1979; Wahbi *et al.*, 1979; Eldirdiri *et al.*, 1987 and Abdalla *et al.*, 1989).

Comparison of blood values under different management systems seems to be important as these values reflect the well-being of the animal and are used extensively as diagnostic tests.

This work is an attempt to compare the normal concentration of some blood constituents in grazing and stabled camels.

MATERIALS AND METHODS

Animals: A total of 48 blood samples were obtained from two year-old male camels grazing naturally in the area of Abu Deleig (North-east of Khartoum town). Further 48 samples were obtained from twelve two-years old camels housed in open shades at Sudan University of Science and Technology (SUST) Experimental Farm. The camels were kept on a roughage concentrate mixture to meet their growth requirements.

Blood Sampling and Analysis: For the hematological analysis blood was obtained by jugular venipuncture into vacutainers containing disodium ethylenediamine-tetra-acetic acid (EDTA) as an anti-coagulant. 5ml blood were drawn into clean dry test tubes for serum analysis. Serum was separated by centrifugation and then stored at -20°C for later analysis.

The anti-coagulated blood was used immediately for the determination of erythrocyte count, packed cell volume (PCV), hemoglobin (Hb) concentration, erythrocyte sedimentation rate (ESR) and total leukocyte count. The hematological indices, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC), were calculated from the erythrocytic series values (Dacie and Lewis, 1992).

Colorimetric method was adopted for the determination of Ca, P, and Mg using Unicam-8625 UV Spectrophotometer. Serum Na and K were determined by a flame photometer (Corning 400, England). Linear Chemicals were used.

Statistical Analysis: Data were analyzed by student t-test using SPSS programe.

RESULTS

The mean \pm the standard deviation of the erythrocyte count, hemoglobin concentration, PCV, MCHC, ESR and total WBC count are shown in (Table 1).

A highly significant variation ($P<.01$) is observed between the two animal groups in the Hb concentration, PCV, MCV and WBC count. The MCH varied at a lower level of significance ($P<.05$), while RBC count, and ESR does not vary significantly between the two groups.

Table (1): Erythrocyte count, Hb concentration, PCV, MCHC, ESR and total WBC in stabled and grazing camels.

Parameters	Variable	Stabled (M±SD)	Grazing (M±SD)
Erythrocytes ($10^6/ml$)		7.27±1.11	7.45±1.4
Packed cell volume (PCV)%		26.34±1.63 **	24.87±2.63
Hb (g/dl) or (g/100ml)		11.48±1.39**	10.62±1.51
MCV (fl)		36.94±4.53**	33.65±4.39
MCH (pg)		15.46±2.65*	14.23±2.19
MCHC (g/dl) or (g/100ml)		43.07±4.83	42.41±3.73
Total Leucocytes ($10^3/ml$)		11.54±2.7*	8.47±1.86

** Highly significant ($P<.05$), * Significant ($P<.01$).

The serum concentrations of the investigated minerals are shown in (Table 2) as means ± standard deviation. The grazing animals had higher serum concentration of Mg and K ($P<.01$). The concentration of Na, Ca and P does not vary significantly between the two groups. For technical reasons the serum iron concentration of the stabled animals was not done.

Table (2): Serum concentration of Na, K, Ca, P, Fe and Mg in stabled and grazing camels

Parameters	Variable	Stabled M±SD	Grazing M±SD
Na (m/mal/l)		125±2.40	127.29±3.08
K (m/mal/l)		3.79±0.49	4.15±0.15*
Ca (mg/100ml)		7.44±0.19	7.48±0.16
P (mg/100ml)		3.82±0.2	3.72±0.42
Fe (ug/100ml)		-	57.00±13
Mg (mg/100ml)		1.75±0.47	2.25±0.33

* Significant ($P<.05$)

DISCUSSION

It is known that the blood measures are correlated with the nutrients (Rasheed, 2004; Mills, 1987). This may explain the high concentration of Mg

and K obtained by the grazing animals, as these animals may have been grazing on plants rich in these minerals or/ and may be contaminated with the soil. The camel homeostatic mechanism may have kept a similar concentration of Na, Ca and P for the two groups. The serum Mg content in this study compares favorably with that obtained by (Wahbi, 1979). The same was true for the ferrous (Fe) concentration when compared with the results of (Haroun, 1994) for the Najdi young camels of Saudi Arabia.

Serum concentrations of Ca, K and Na obtained in this study were lower than those obtained by (Hassan, 1968) for camels of Kordofan and Darfour. (Wahbi *et al.*, 1979) and (Musa and Babiker, 1983) found higher values for Na. Previous reports have shown higher values for Na, K, Ca, P and Fe around Tamboul area (Wahbi *et al.*, 1979; Musa and Babiker, 1983). The discrepancy of this work with the findings of the early workers may be attributed to many variables known to affect the blood constituents such as breed, age, environmental conditions, season of the year, physiological status and the degree of hydration of the animal.

ESR values seem to be similar for both stabled and grazing animals. Although the erythrocyte count did not vary between the studied animals, a significant variation was found in the erythrocytic series as well as the hematological indices. This may be due to the fact that stabled animals were deformed against both internal and external parasites as (Tartour and Idris 1968) found that many of the clinically healthy zebu cattle were actually sub-clinically infected with parasites.

Other factors which are not investigated like hormones vitamins, antinutritional factors and feed components interaction may have caused this variation. No explanation was found for the high WBC count observed in the stabled animals.

The erythrocyte count, hemoglobin concentration, PCV, MCV, MCH and MCHC values obtained in this study were within the range obtained by (Hassan *et al.*, 1968) and (Musa and Mukhtar, 1983). Higher values for erythrocyte count, PCV, MCV, and MCHC in camels in were recorded by (Abdelgadir *et al.*, 1979) and (Wahbi *et al.*, 1979) in Sudan, and by (Tabtareel and Nazifi, 2001) for the dromedary camels in Iran and for the llamas in South America (Middleton, 1999). However,

the observed values obtained in all these reports lie within the normal values range reported by other researchers and compiled by (Manfield, 1996).

The results obtained in this study may suggest that the natural range pasture satisfies camel needs with respect to the normal hemopoiesis and moreover, it stabilizes camel results in improved hematological indices.

It can be recommended that more studies need to be carried out to investigate the effect of stabling camels with regard to the other variables which may influence the blood constituents.

ACKNOWLEDGEMENT: This work was kindly supported by the University of Sudan for Science and Technology (SUST). The researchers would like to express their gratitude to the University Principal, Dr. Osama A. Rayis, for his enthusiasm and unlimited help. Thanks are also extended to Dr. M.T. Ibrahim for the statistical analysis. The technical assistance provided by Mrs. Rawda Bashir and Miss Omaymah is highly acknowledged.

REFERENCES

- 1- Abdalla, O. M.; Wasfi, I. A. and Gadir, F. A. (1988). The Arabian race camel normal parameters: hemogram, enzymes and minerals. *Comp. Biochem. Physio.* **90(2)**: [237-239].
- 2- Abdel Gadir, S. E.; Wahbi, A.A. and Idris, O. F. (1979). A note on the hematology of adult Sudanese camels. *Workshop on Camels. Khartoum. IFS Provisional Report. 6*: [347-354].
- 3- Amer, A.A.; Abou El-Ela and Ratib, H.Z. (2006). Some hematobiochemical studies on sarcoptic mange infected camels before and after treatment by Doramectin in Assiut Governorate. *Proc. of the International Scientific Conference on Camels.*
- 4- Anon (2004). *Livestock Population in Sudan. Report of Animal Production Administration, Ministry of Agriculture Animal Resources, Khartoum, Sudan.*
- 5- Babiker, S. A. (2000). *Principles of Animal Production Curriculum. Ministry of Education. Khartoum, Sudan.*
- 6- Dacie, J. V. and Lewis, S. M. (1991). *Practical Hematology. Churchill, Livingstone. Edinburgh. UK.*
- 7- Eldirdiri, N.1.; Suliman, H.B and Shommein, A. M. (1987). Normal serum activities of some diagnostic enzymes in dromedary camels in Sudan. *Vet. Res. Communic.* **11**: [201-203].

- 8- **FAO** (1995). Quarterly Bulletin of Statistics. Food and Agriculture Organization, UN, Rome. **8**: [31-36].
- 9- **Farah, Z. T.; Rellenmayer, R. and Atkins, D.** (1992). Vitamin A content of camel milk. *Int. J. Vitamin Nut. Res.* **62**: [30-33].
- 10- **G. W. Manefield** (1996). Camels: A compendium. Series, No. **22**: [60-61]. *Bul. University of Sydney. Post Graduate Foundation in Vet. Sci.*
- 11- **Haroun, E. M.** (1994). Normal concentration of some blood constituents in young Najdi Camels (*Camelus dromedarius*). *Comp. Biochem. Physiol.* **Vol. 108 A No. 4**: [619-622].
- 12- **Hassan, Y.M.; Hoeller, H. and Hassan, I.M.** (1968). Observations on the blood constituents of camels in the Sudan. *Sud. J. Vet. Sci. Anim. Husb.* **9(1)**: [464-474].
- 13- **Knoess, K. H.** (1977). The camel as milk and meat animal. *World Anim. Rev.* **22**: [39-44].
- 14- **Middleton, J. R.** (1999). Hematology of South American Camelidae. *Journal of Camel Practice and Research.* **Vol. 6(2)**: [153-158].
- 15- **Mills, C. F.** (1987). Biochemical and mineral status in animals: copper, cobalt and zinc. *J. of Anim. Sci.* **65**: [1702-1711].
- 16- **Mokhtar, M. EL-Hisanonein** (1998). Proceedings of the International Symposium Constraints and Possibilities of Ruminant Production. Cairo, Egypt.
- 17- **Musa, B. E. and Babikir, A. M.S.** (1983). Studies on the normal hemogram and some blood electrolytes in camels (*Camelus dromedarius*). *Sud. J. Vet. Sci. and Anim. Husb.* **23**: [38-43].
- 18- **Rasheed, M. N.** (2004). Trace elements in camel tissues from a semi-arid region. *Environmentalist J.* ISSN 0251-1088. Part 1573-2991 (online), Website: WWW.F:/trace%20 mineral-cmel.htm.
- 19- **Tabtaref, A. and Nazifi, S.** (2001). Biochemical and cytological properties of blood and peritoneal fluid in clinically healthy adult camels. (*Camelus dromedarius*). *Journal of Camel Practice and Research.* **Vol. 8(2)**, [123-126].
- 20- **Tartour, G. and Idris, O. F.** (1968). A physiochemical study on the blood of Zebu Cattle in the Sudan. *Sud. J. Vet. Sci. Anim. Husb.* **10(2)**: [90-95].
- 21- **Wahbi, A.A.; Abd El Gadir, S.E. and Idris, O.F.** (1980). Plasma electrolytes and minerals of camel in the Sudan. *IFS Provisional Report. No. 6*: [355-364].