

Central Veterinary Research Laboratory (CVRL), Soba, Sudan.

**PRELIMINARY DATA ON SERUM THYROID  
HORMONES (THYROXINE T<sub>4</sub>, TRIIODOTHYRONINE  
T<sub>3</sub>) AND THYROID STIMULATING HORMONE (TSH)  
OF SUDANESE DONKEYS (*EQUUS ASINUS*):  
NORMAL LEVEL  
(With One Table)**

By

***Y.H.A. ELMANSURY; H.I. SERI\*;  
HUSNA M. ELBASHIR; M.M. SALIH  
and A.M. AMAJID\*\****

\* Faculty of Veterinary Science, University of Nyala, Sudan.

\*\* National Centre for Research, Khartoum, Sudan.

(Received at 1/9/2007)

دراسة تمهيدية عن المستوي الطبيعي لهرمونات الغدة الدرقية في مصل الدم  
(الثايرونين ثلاثي اليود و الثايروكسين) والهرمون المنشط للدرقية  
في الحمير السودانية السليمة إكلينيكيًا

يوسف حسين عبد الله المنصوري ، هشام إسماعيل سري ،  
حسنه محمد البشير ، محمد محمد صالح ، علي محمد عبد الماجد

في هذه الدراسة تم قياس مستوى هرمونات الغدة الدرقية و الفص الأمامي للغدة النخامية.  
حيث تم قياس تركيز T<sub>3</sub> و T<sub>4</sub> ، وهرمون الغدة النخامية TSH في مصل الدم في إناث  
وذكور الحيوانات السليمة ظاهريًا وذلك باستخدام تقنية المقايسة المناعية الشعاعية (RIA)  
والتي أظهرت أن الذكور تحتوي على مستوى أقل من الإناث بالنسبة لهرمون الثايرونين  
ثلاثي اليود بينما الإناث لديها مستوى أقل من هرمون الثايروكسين مقارنة بالذكور. بيد أنه لا  
يوجد اختلاف بين الجنسين بالنسبة للهرمون المنشط للدرقية.

### **SUMMARY**

The objective of this study was to determine serum thyroid hormones (Thyroxine T<sub>4</sub>, Triiodothyronine T<sub>3</sub>) and the anterior pituitary secretion Thyroid Stimulating Hormone (TSH) in normal healthy donkeys in Sudan. Detection of such hormones was done using Radio-immune assay (RIA) and immuno-radiometric assay (IRMA) techniques. The obtained values (mean  $\pm$  standard deviation, SD) of male and female animals were comparable. The mean values for serum thyroxine (T<sub>4</sub>)

were  $8.46 \pm 7.19$  (1.40 - 25.73) ng/ml, the serum triiodothyronine ( $T_3$ )  $0.52 \pm 0.21$  (0.20 - 1.03) ng/ml, and thyroid stimulating hormone (TSH) were  $0.86 \pm 0.13$  (0.64 - 1.15) mIU/L.

**Key words:** *Thyroxine, triiodothyronine, Thyroid Stimulating Hormone, Radioimmunoassay, donkeys*

## INTRODUCTION

The domestic donkey (*Equus asinus*) is a member of the horse family. The donkey has played an important role in most parts of the Sudan. They were estimated as 6,350,000 head, however they cost less and can tolerate dry conditions and live on poor feed rejected by other classes of livestock.

Before the release of the radioimmunoassay (RIA), thyroid function was evaluated on the basis of protein-bound iodine (Swenson, 1970). With the introduction of RIA came the ease and rapidity needed to facilitate routine thyroxine determinations in clinical studies; therefore, reference values must be established. Normal thyroid hormone concentrations reported for horses have a wide range of values (Kallfelz and Erali, 1973, Reap *et al.*, 1978; Thomas and Adams, 1978). There were significant differences in the thyroid hormones concentration related to time of blood collection during the day (Duckett *et al.*, 1989). The purpose of this study was to report a mean  $T_3$ ,  $T_4$  and TSH values in the serum of clinically donkeys (*Equus asinus*).

## MATERIALS and METHODS

### Experimental animals:

Thirteen male and 13 female donkeys, 4-10 years were used in this study. The animals were housed in the premises of the Radioisotopes Department, Central Veterinary Research Laboratories (CVRL) Soba, Sudan. They were provided with water from tap and straw *ad libitum*. The animals were allowed to adapt for one month before the commencement of the experiment.

Blood samples of 5ml were collected from the jugular veins in plain vacutainer tubes, allowed to clot. Serum was then separated in sealed plastic containers and stored at  $-20^\circ\text{C}$  until analyzed

### Hormones detection

Thyroxine ( $T_4$ ) and triiodothyronine ( $T_3$ ) were measured in donkey's serum using RIA Kit (Beijing Atom High-tech. Co. LTD). Thyroid Stimulating Hormone (TSH) was measured using the IRMA

technique. The principal method of this IRMA kit utilizes two site sandwich immuno-radiometric assay for the measurement of TSH in serum. This involves the reaction of TSH present in serum with monoclonal and polyclonal antibody. The monoclonal antibody is labeled with  $I^{125}$  as tracer ( $I^{125}$ -McAb) and the polyclonal antibody is coupled to magnetic iron oxide particle (PcAb {M}). the formed complex was separated using a magnetic separator.

Obtained values were expressed in ng/ml for  $T_3$  and  $T_4$  whereas for TSH in mIU/L.

### **Statistical analysis**

Statistical analysis was made using SPSS 11.5 for windows, Student t- test and person correlation were used to compare means.

## **RESULTS**

Both methods used (RIA and IRMA) are able to detect the thyroid hormones with sensitivity of 0.08 ng/ml, 0.13 ng/ml, and 0.24 mIU/L for  $T_3$ ,  $T_4$  and TSH respectively.

Serum thyroxine ( $T_4$ ), triiodothyronine ( $T_3$ ), and thyroid stimulating hormone (TSH) concentrations  $T_3$  and  $T_4$  in normal male and female donkeys are shown in table (1).

The mean serum  $T_3$  values of the male donkeys are almost the same as that of the female donkeys ( $P > 0.05$ ) as shown in Table (1). The individual values in both sexes was found to range between 0.2- 1.03 ng/ml.

Male donkeys showed higher concentration of serum Thyroxin ( $T_4$ ) than female donkeys but this was not statistically different ( $P > 0.05$ ). This was found to range between 1.40 – 25.73 ng/ml. The mean value of TSH was similar in both sexes ( $P > 0.05$ ). This found to range between 0.64-1.15 mIU/L.

**Table 1:** Mean  $\pm$  SD, minimum and maximum values of  $T_3$ ,  $T_4$  and TSH concentration in donkeys' serum.

Hormone	Male	Female	All donkeys	Minimum	Maximum
$T_3$ (ng/ml)	0.50 $\pm$ 0.21	0.53 $\pm$ 0.21	0.52 $\pm$ 0.21	0.20	1.03
$T_4$ (ng/ml)	11.01 $\pm$ 7.94	6.28 $\pm$ 5.21	8.46 $\pm$ 7.19	1.40	25.73
TSH (mIU/L)	0.86 $\pm$ 0.14	0.86 $\pm$ 0.14	0.86 $\pm$ 0.13	0.64	1.15

## DISCUSSION

In this study, the normal values of the thyroid hormones, T<sub>3</sub> and T<sub>4</sub> as well as the anterior pituitary secretion TSH in donkeys, were measured. According to our knowledge, this is the first data baseline not only in Sudan but may be worldwide.

Although there is no available data for donkey's thyroid hormones, it was found that the results obtained in this study were comparable with that data reported for horses by other investigators.

Donkeys in this study were not in any training or exercise programme which avoided and possible influence of exercise on hormone levels. This study revealed that the T<sub>3</sub> values are in a close agreement with that of Duckett *et al.*, (1989) in horses who reported a level of  $54.06 \pm 14.02$  ng/dl and a range of 13.30 to 97.40 ng/dl; Sojka *et al.*, (1993) reported baseline values for horses ranging from 0.21 to 0.80 ng of T<sub>3</sub>/ml. whereas Chen and Riley (1981) found that the mean value of T<sub>3</sub> 192.9 µg/dl is for neonatal foals and 98.96 µg/dl for mature horses.

In the present study it was noticed that female donkeys had lower T<sub>4</sub> values as compared with that of males. The range values for T<sub>4</sub> in this study were in a close agreement with that of Sojka *et al.*, (1993); however the mean  $\pm$  SD for T<sub>4</sub> in all donkeys is lower than that found by Thomas and Adams (1978).

The present study also revealed no significant difference in the obtained values of T<sub>3</sub> and TSH in both sex. However, the thyroid hormone levels in horses were found to be lower in mares than in stallions (Reap *et al.*, 1978), and lower in stallions and geldings than mares (Motley, 1972; Irvine, 1967). While other investigators have found no difference in thyroid hormones between sexes in horses (Kallfelz, 1982).

## ACKNOWLEDGMENTS

The generous financial support granted by the Central Veterinary Research Laboratory (CVRL) Soba and National Centre for Research (NCR), Sudan and German Academic Exchange Service (DAAD) was greatly acknowledged. Due thanks are also extended to the staff members of the Department of Radioisotopes (CVRL).

## REFERENCES

- Chen, C.L.; and Riley, A.M. (1981):* Serum thyroxine and triiodothyronine concentrations in neonatal foals and mature horses. *Am. J. Vet. Res.* 42, 1415-1417.
- Duckett, W.M.; Manning, J.P. and P.G. Weston (1989):* Thyroid hormone periodicity in healthy adult geldings. *Equine Vet. J.* 21: 123-125.
- Irvine, C.H.G. (1967):* Thyroxine secretion rate in the horse in various physiological states. *J. Endocr.* 39, 313-320.
- Kallfelz, F.A. (1982):* The thyroid. In: *Equine Medicine and Surgery*. 3<sup>rd</sup> edition. Eds: R. A. Mansmann, E. S. McAllister and P. W. Pratt. Am. Vet. Publ., Santa Barbara, California. p. 891-895.
- Kallfelz, F.A. and Erali, R.P. (1973):* Thyroid function tests in domesticated animals: free thyroxine index. *Am. J. Vet. Res.* 34: 1449-1451.
- Mason, I.L. (1996):* A World Dictionary of Livestock Breeds, Types and Varieties. 4<sup>th</sup> Edition. C. A. B International. 273 pp.
- Motley, J.S. (1972):* Use of radioactive triiodothyronine in the study of thyroid function in normal horses. *Vet. Med. Small Anim. Clin.* 67, 1225-1228.
- Reap, M.; Cass, C. and Hightower, D. (1978):* Thyroxine and triiodothyronine levels in ten species of animals. *Southwest Vet.* 31, 31-34.
- Sojka, J.E.; Johnson, M.A. and Bottoms, G.D. (1993):* Serum triiodothyronine, total thyroxine, and free thyroxine concentrations in horses. *Am. J. Vet. Res.* 54: 52-55.
- Swenson, M.J. (1970):* *Dukes's Physiology of Domestic Animals*, 8th ed. New York, Cornell University Press. P 1205.
- Thomas, C.L.Jr. and Adams, J.C. (1978):* Radioimmunoassay of equine serum for thyroxine: reference values. *Am. J. Vet. Res.*; 39: 1239.