

## Thyroxine (T<sub>4</sub>) and triiodothyronine (T<sub>3</sub>) in female camels and cows

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### ABSTRACT

Thirteen lactating dairy cows from Al-Fateh University Farm and 25 female camel (*Camelus dromedarius*) from Tripoli abattoir were used in the experiment. Blood samples were taken from cows via tail vein puncture using vacutainer needles. Blood samples from camels were collected during slaughtering at the abattoir. Thyroxine (T<sub>4</sub>) and Triiodothyronine (T<sub>3</sub>) concentrations were measured in all blood samples using reliable radioimmunoassay procedures (RIA). The results showed that camels have significantly higher plasma concentrations of T<sub>4</sub> and T<sub>3</sub> than cows.

### INTRODUCTION

It has been considered that thyroid gland as represented by its hormones (T<sub>4</sub> and T<sub>3</sub>) plays an important role in regulation of metabolic activity (1). In dairy cattle, milk secretion has greater demands for metabolic activity than pregnancy (1). Dairy cows at late stage of pregnancy had higher T<sub>4</sub> and T<sub>3</sub> levels in the plasma than high yielding dairy cows at midstage of lactation (5). Based on early observations using protein bound iodine (PBI) as an estimate of T<sub>4</sub>, it was reported that camels had lower metabolic rate, lower thyroid secretion rate and higher plasma T<sub>4</sub> levels than cows (4). In another Camelidea family, it was shown that plasma levels of T<sub>4</sub> and T<sub>3</sub> in llama «*Llama glama*» were 106 and 1.95 ng/ml, respectively (5). There are several reports on measurements of T<sub>4</sub> (few on T<sub>3</sub>) in blood of dairy cattle (3, 5,7,8). However, information on these hormones in the camel are still limited. Therefore, the aim of the present study was to use a reliable method of radioimmunoassay (RIA) to compare the circulating levels of T<sub>4</sub> and T<sub>3</sub> in female camels and cows.

### MATERIALS AND METHODS

Thirteen holstein dairy cows at approximately same age, stage of lactation and pregnancy, from Al-Fateh University Farm and 25 non-pregnant non-lactating Libyan female camels from Tripoli abattoir were used in this experiment. Blood samples were obtained from all cows via tail vein and from all camels during the time of slaughtering in the abattoir. All blood samples were centrifuged at 3000 g for 20 min. and plasma

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were stored in vials at  $-4^{\circ}\text{C}$  and transported to University of Missouri, Columbia (USA) in liquid nitrogen for hormonal analysis.

All samples were assayed for thyroxine ( $T_4$ ) and triiodothyronine ( $T_3$ ) using the modified radioimmunoassay technique as described previously (5). All data were subjected to one way analysis of variance using LSD to test the differences between means (6).

## RESULTS AND DISCUSSION

It should be noted that bleeding via tail vein or jugular vein had no effect on plasma levels of  $T_4$  and  $T_3$  in cattle (unpublished data). However, effects of slaughtering remain for further investigations.

Plasma thyroxine ( $T_4$ ) and triiodothyronine ( $T_3$ ) concentrations in camels and cows are presented in Table 1. Thyroxine and  $T_3$  concentrations are higher ( $P < 0.05$ ) in camels than in cows. In cows these values are very similar to those reported recently (5, 7, 8). In camels the values are comparable to early plasma  $T_4$  values measured indirectly by protein bound iodine (PBI) (4) also similar to the  $T_4$  values reported for other Camelidae breed «*Llama Glama*» (2). Thyroid activity is directly related to metabolic activity of the animal, therefore, levels of  $T_4$  and  $T_3$  in circulating blood may not be a good indicator for such relationship, since high yielding dairy cows with high metabolic requirements showed lower plasma  $T_4$  and  $T_3$  than low yielding cows (5, 7,). Furthermore, cows with higher metabolic activity than camels (4), had lower plasma concentrations of  $T_4$ . Therefore, one might suggest that the discrepancy between levels of thyroid hormones in blood and the rate of metabolic activity could be due to differences in the efficiency of hormone utilization at tissue levels. Thyroid hormones in blood are found largely bound to thyroid binding globulin (TBG), and only free moieties of the hormones are biologically active and available for metabolic usage. Therefore, measurements of  $T_4$  and  $T_3$  in blood may mislead the interpretation of the animal metabolic status unless detailed investigations on rate of  $T_4$  and  $T_3$  utilization, binding affinity and potentiality are undertaken. In conclusion, the aforementioned results showed that camels had greater plasma concentration of thyroid hormones ( $T_4$  and  $T_3$ ) than cows. These may reflect some kind of adaptive mechanisms by which camels can adjust their metabolic needs under different unfavorable conditions.

**Table 1** — Plasma  $T_4$  and  $T_3$  conc. (ng/ml) in camels and cows

Character	Dairy cows n = 13	Camel n = 25
Plasma $T_4$ (ng/ml)	36.87 $\pm$ 1.85 <sup>a</sup>	100.77 $\pm$ 5.30 <sup>b</sup>
Plasma $T_3$ (ng/ml)	0.27 $\pm$ 0.04	0.88 $\pm$ 0.07 <sup>b</sup>

<sup>a, b</sup> Superscripts with different letters on same line are statistically different ( $P < 0.05$ )

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## تركيز هرمونات الغدة الدرقية في الابل والأبقار

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### المستخلص

13 بقرة خلوب نوع الفريزيان من مزرعة كلية الزراعة / جامعة الفاتح و 25 ناقة من الابل الليبية قد استخدمت في هذه التجربة. عينات الدم من الأبقار أخذت عن طريق وريد الذيل. بينما عينات الدم في الابل جمعت أثناء عملية الذبح في السلخانة بطرابلس. كل العينات تم تحليلها وحدد تركيز هرمونات الغدة الدرقية T<sub>3</sub> و T<sub>4</sub> فيها بواسطة النظائر المشعة. ودلت نتائج هذه الدراسات على أن تركيز هذه الهرمونات في الابل أعلى بكثير عما هو عليه في الأبقار.