

Thyroxine (T₄) and triiodothyronine (T₃) 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 (T₄) and Triiodothyronine (T₃) concentrations were measured in all blood samples using reliable radioimmunoassay procedures (RIA). The results showed that camels have significantly higher plasma concentrations of T₄ and T₃ than cows.

INTRODUCTION

It has been considered that thyroid gland as represented by its hormones (T₄ and T₃) 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 T₄ and T₃ 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 T₄, it was reported that camels had lower metabolic rate, lower thyroid secretion rate and higher plasma T₄ levels than cows (4). In another Camelidae family, it was shown that plasma levels of T₄ and T₃ in llama «*Llama glama*» were 106 and 1.95 ng/ml, respectively (5). There are several reports on measurements of T₄ (few on T₃) 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 T₄ and T₃ 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°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 ± 1.85^a	100.77 ± 5.30^b
Plasma T_3 (ng/ml)	0.27 ± 0.04	0.88 ± 0.07^b

^{a, b} 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 T₃ و T₄ فيها بواسطة النظائر المشعة. ودلت نتائج هذه الدراسات على أن تركيز هذه الهرمونات في الابل أعلى بكثير عما هو عليه في الأبقار.