

## Thyroid Hormones Levels in Growing Male Camels Fed Different Levels of Commercial Feeds

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**Abstract.** Thyroxine ( $T_4$ ) and triiodothyronine ( $T_3$ ) hormones were measured in the blood serum of young, male Somali camels to determine their relationships with body weight. Sixty male Somali camels (mean body weight 221kg) were divided into 6 groups and were fed on 6 different diets of roughage: concentrate (25:75). The commercial concentrates were replaced with barley grain at the rate of 0, 50, 100%. Rhodes grass was fed alone or mixed with alfalfa hay at the ratio of 2:1, respectively. The animals were fed twice daily and water was provided *ad libitum* for 90 days. All camels were weighed fortnightly and blood samples were also collected for  $T_3$  and  $T_4$  determination by specific double antibody radioimmunoassay. Daily body weight gain and  $T_4$  level have increased significantly ( $P<0.01$ ) with the increase in the level of the commercial concentrate. Both  $T_3$  and  $T_4$  concentrations have increased with increasing body weight throughout the study period and were significantly ( $P<0.01$ ) correlated with body weight ( $r = 0.19$  and  $0.26$ , respectively).  $T_4$  level was higher in camels given high levels of commercial concentrate compared to those fed on higher levels of barley. The results show that thyroid hormones may be indicators of body weight gain in growing male camels fed on high level of concentrates compared with those given non-concentrate with roughage hay.

**Key words:** Dromedary camels, Growing,  $T_4$  and  $T_3$  hormones

### Introduction

Thyroxine ( $T_4$ ) and triiodothyronine ( $T_3$ ), hormones of the thyroid gland, are the major regulators of the metabolic rate, growth, and development of animals. Several studies have been undertaken to determine the role of physiological changes in thyroid activity in meat producing animals [1-9]. These studies have suggested a positive relationship between circulating thyroid concentrations and growth rate. Although there are a few reports on thyroid hormone concentrations in the camel [9-12], the studies on the relationship between the activity of thyroid hormones and the performance of calf-camels are very scanty. Hence, the present study was undertaken to investigate the variations in the levels of thyroid hormones in growing male camels fed different diets.

### Materials and Methods

Sixty, 1- year old, male Somali camels, weighing 215- 230 kg were selected from 1200 animals and were randomly divided into 6 equal groups. The animals were fed on 6 different diets containing roughage: concentrate ratio of 25:75 in 2x3 factorial arrangement (Table 1). Two kinds of roughage were used: Rhodes grass hay alone and Rhodes grass hay with alfalfa hay at the ratio of 2:1. Three levels of commercial concentrates: 0, 50 and 100% were used as replacement of whole barley grain. The commercial concentrates were composed of 58.75% barley, 30% wheat bran, 3.5 % soybean meal, 3% molasses, 4% limestone, 0.3% salt, 0.25% premix and 0.3% binder. The animals were randomly assigned to 6 pens and allotted to one of the 6 diets, and they were fed in-groups twice daily and water was provided *ad libitum*.

**Table 1. Actual daily dry matter intake (kg/head) of the experimental diets fed to Somali male young camels**

Traits	R: C:	Rhodes grass			Rhodes + Alfalfa		
		0	50	100	0	50	100
Concentrate		00	2.16	4.22	00	2.15	4.25
Barley		4.18	2.16	00	4.19	2.15	00
Rhodes hay		1.54	1.59	1.55	1.05	1.05	1.05
Alfalfa		00	00	00	0.52	0.52	0.52
Total intake		5.72	5.91	5.77	5.75	5.87	5.82

R: Roughage

C: Percentage of commercial concentrate

Throughout the study period (12 weeks, from October 1998 through December 1998), all camels were weighed by platform digital balance at 2-week intervals, and at the same time blood samples were collected from jugular vein into 10-ml plain vacutainer tubes. Blood samples were centrifuged at 3000 g for 20 min under cooling (5°C) and the serum was stored at -20°C till analysis. Concentrations of thyroxine (T<sub>4</sub>) and triiodothyronine (T<sub>3</sub>) were estimated by a direct solid phase <sup>125</sup>I-based radioimmunoassay method (Coat-A-Count TKT<sub>3</sub> and TKT<sub>4</sub>, Diagnostic Product Corporation, Los Angeles, CA, USA) in 25-µl aliquots of serum for T<sub>4</sub> and in 100-µl aliquots of serum for T<sub>3</sub>. All samples were assayed in duplicate using the method described by the manufacturers. The main cross reactivities for the T<sub>4</sub> assay were 100%, 2% and 2% for l-thyroxine, triiodo-l- thyronine and triiodothyroacetic acid and for the T<sub>3</sub> assay 100%, 0.5% and 0.1% for triiodo-l- thyronine, l- thyroxine and triiodothyroacetic acid, respectively. The intra-assay CV were 0.032 and 0.055 and inter-assay CV were 0.082 and 0.076 for T<sub>4</sub> and T<sub>3</sub> assays, respectively. Data were statistically analyzed using a general linear model procedure [13].

### Results and Discussion

The results showed that camels consumed roughage more than concentrates, therefore, the roughage to concentrate ratio was increased from 25:75 to 27:73 %. There were no significant differences in the initial body weight between the six groups of camels. The final body weight has significantly increased (P<0.01) with the increase in

the level of commercial concentrate (240, 261 and 256 or 240, 259 and 269 Kg, for level of 0, 50 and 100% of concentrate with Rhodes grass or concentrate plus Rhodes grass and alfalfa, respectively). Similarly, the daily body weight has significantly increased ( $P < 0.01$ ) with the increase in the level of the commercial diet (239, 525 and 512 or 342, 453 and 500 g, for level of 0, 50 and 100 % of concentrate with Rhodes grass or concentrate plus Rhodes grass and alfalfa, respectively).  $T_3$  and  $T_4$  concentrations were 2.4, 2.4, 2.5 and 100, 111 and 112 ng/ml for camels fed 0, 50 and 100% commercial concentrate with Rhodes grass hay, respectively. In addition,  $T_3$  and  $T_4$  concentrations have increased (2.2, 2.6, 2.5 and 101, 112, 111 ng/ml, respectively) in camels fed the same level of commercial concentrate plus Rhodes grass and alfalfa hay (Table 2).

**Table 2. Least-squares means and standard errors for body daily gain and serum levels of triiodothyronine ( $T_3$ ) and thyroxine ( $T_4$ ) in Somali growing male camels fed the experimental diets**

Traits	R:	Rhodes grass			Rhodes + Alfalfa		
	C:	0	50	100	0	50	100
No. of animals		10	10	10	10	10	10
Initial weight(kg)		221.7 ± 7.76	221.3 ± 6.68	217.2 ± 7.78	214.1 ± 5.14	224.8 ± 4.97	231.5 ± 7.51
Final weight (kg)		239.6 <sup>c</sup> ± 6.21	260.7 <sup>b</sup> ± 7.77	255.6 <sup>a</sup> ± 6.91	239.8 <sup>c</sup> ± 5.23	258.8 <sup>ab</sup> ± 4.80	269.0 <sup>a</sup> ± 7.63
Period (days)		75	75	75	75	75	75
Daily gain (g)		238.67 <sup>d</sup> ± 41.71	525.33 <sup>a</sup> ± 65.11	512 <sup>a</sup> ± 40.06	342.67 <sup>c</sup> ± 63.17	453.33 <sup>b</sup> ± 22.49	500.00 <sup>a</sup> ± 30.61
$T_3$ (ng/ml)		2.36 ± 0.13	2.39 ± 0.13	2.52 ± 0.13	2.16 ± 0.13	2.60 ± 0.13	2.49 ± 0.13
$T_4$ (ng/ml)		100.75 <sup>b</sup> ± 2.86	111.86 <sup>a</sup> ± 2.86	112.86 <sup>a</sup> ± 2.86	101.49 <sup>b</sup> ± 2.86	112.23 <sup>a</sup> ± 2.86	111.31 <sup>a</sup> ± 2.86

R: Roughage.

C: Percentage of commercial concentrate.

<sup>a, b, c, d</sup> Means in same row with different superscripts are significantly different ( $P < 0.01$ ).

Our findings were in agreement with earlier reports indicating that daily body gain in lambs was found to increase with the concentrate level [14]. Similarly, Field [10] showed that the average daily weight gain of the African camel (Kenya) from birth to six months, was 225 g under browsing conditions, and 655 g/day under intensive feeding regime. Both  $T_3$  and  $T_4$  concentrations have increased with increasing body weight throughout the growing period.  $T_3$  and  $T_4$  concentrations have significantly ( $P < 0.01$ ) correlated with body weight ( $r = 0.19$  and  $0.26$ , respectively) over the study period (Fig.1). The present results indicate that the commercial concentrate, which contained 50% barley, plus Rhodes grass hay and alfalfa hay at the ratio of 26.9: 73.1 roughage: concentrate, respectively is more efficient in increasing body weight gain than other diets. Serum concentrations of  $T_3$  and  $T_4$  described in this study are within the range of published values for mammalian blood (1.5 to 3 and 103 to 129 ng/ml, [1-9, 15]). The

results indicate a positive correlation between thyroid hormone levels in serum and body weight during the growing period. This confirmed that the thyroid hormones are important at least in part, as regulators of growth. Previously, Al-Furaiji *et al.* [9,2], have reported a positive correlation between thyroid hormones in plasma and body weight gain during a period of intensive growth in male camels and dairy calves, respectively. The increase in serum  $T_3$  and  $T_4$  and growth rates in camels given high level of concentrates compared with those given non-concentrate (barley) with roughage hay may be due to the nutrient values of these diets. The results have shown that thyroid hormones might be good indicators of body weight gain in growing male camels fed on high levels of concentrates, compared with those given non-concentrate with roughage hay.

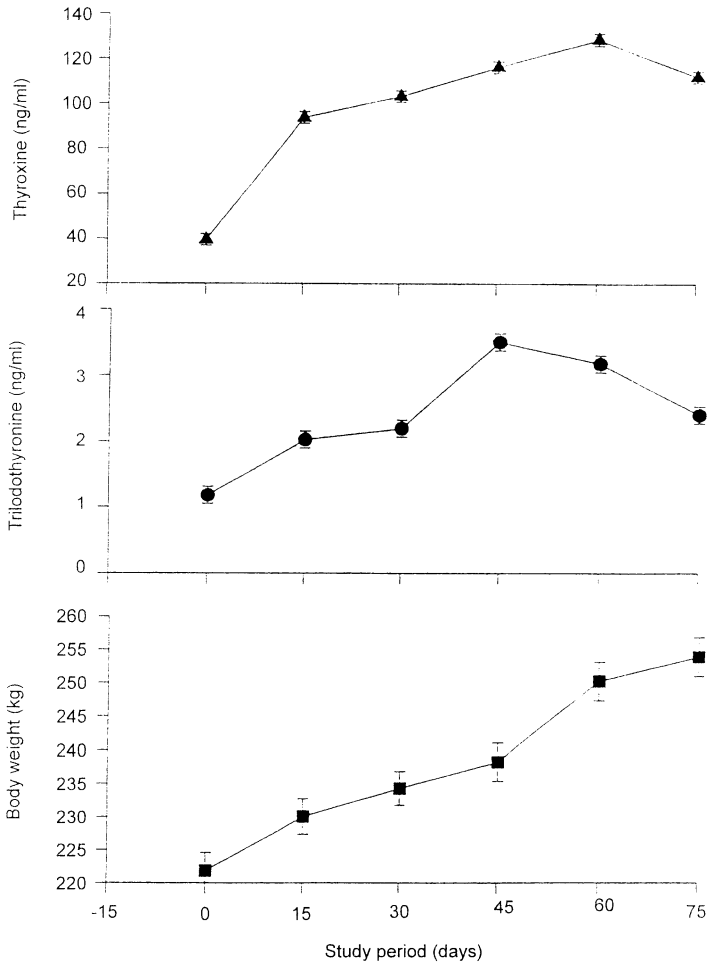


Fig. 1. Plasma thyroxine and triiodothyronine concentrations (ng/ml) and body weight (kg) in growing male camels during the study period.

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## مستويات هرمونات الغدة الدرقية في ذكور حواشي الإبل المغذاة على مستويات مختلفة من العلف المركز التجاري

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منغخص البحث: تهدف الدراسة إلى قياس مستويات هرموني التيروكسين والتيرونين في مصل الدم وعلاقتها بزيادة معدل النمو اليومي في ذكور حواشي الإبل الصومالية. استخدم في هذه الدراسة عدد ٦٠ رأساً من الحواشي الفندانية قسمت إلى ست مجموعات بالتساوي وغذيت على ٦ علائق مختلفة تحتوي على نسبة مكسوان سلفا مائي إلى علف مركز ٧٥:٢٥ لمدة ٩٠ يوماً متصلة. تم إحلال الذكر التجاري بحبوب الشعير بنسبة صفر . ٥ : ١٠ : ١٥ : ٢٠ : ٢٥ : ٣٠، واستخدمت تريس الرودس كمادة مالئة وحدها بعد خلطها بالبرسيم الحجازي بنسبة ١:٢ علفي التجاري. فقد تم إرضاء الحيوانات وأخذ عينات الدم كل أسبوعين، وحتى نهاية التجربة لتقدير تركيز التيروكسين والتيرونين في مصل الدم. أظهرت النتائج الإحصائية المشعة (RIA). أوضحت النتائج أن زيادة نسبة المركز التجاري في العليقة قد أدى إلى زيادة معدل النمو اليومي وارتفاع تركيز هرمون التيروكسين. كما دلت النتائج، أيضاً، على أن هناك علاقة ارتباط معنوية إحصائية ( $P<0.01$ ) بين كل من تركيزي التيروكسين والتيرونين ووزن الحيوان (الارتباط = ٠,٢٦، ٠,١٩). على التوالي. وكان تركيز التيروكسين في الحيوانات المغذاة بالعليقة المحتوية على نسب عالية من العلف التجاري المركز المحتوية على حشيشة الرودس مضافاً إليها البرسيم أعلى معنوياً ( $P<0.01$ ) مقارنة مع تلك التي تناولت نسب عالية من الشعير. نستنتج من هذه الدراسة أن قياس مستويات هرمونات الدرقية يمكن أن يكون مؤشراً لزيادة في أوزان الحواشي الصومالية المغذاة على مستويات عالية من العلف المركز مقارنة بالتي أعطيت مستويات عالية من الشعير.