

A note on relationship of plasma thyroxine and triiodothyronine rate to body weight in growing male camels

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This study was conducted to determine the relationship between plasma concentrations of thyroxine (T_4), triiodothyronine (T_3) and body weight in young Majaheem male camels. Eighteen camels aged 6 to 7 months were divided equally into three groups (G1, G2 and G3). All groups were given concentrate pellets (187 g crude protein per kg) at the rate of 15 g/kg body weight daily. In addition, each group was given one of the following roughages: lucerne hay to G1, rhodes grass hay to G2 and ammonia-treated wheat straw to G3. Roughages, salt and water were measured and given ad libitum. Every 2 weeks all camels were weighed and blood samples were collected. Data were statistically analysed using a general linear model procedure. There was a positive correlation between T_4 concentration and body weight. T_4 was higher in camels given either hay or straw compared with those given rhodes grass hay, while there were no differences among the three groups in T_3 and in body weight.

Keywords: body weight, camels, thyroxine, triiodothyronine.

Thyroxine (T_4) and triiodothyronine (T_3), hormones of the thyroid gland, are major regulators of metabolic rate, growth, and development of animals. Several studies have been undertaken to determine the rôle of physiological changes in thyroid activity in meat producing species (Kunkel, Colby and Lyman, 1953; Draper, Falconer and Lamming, 1968; Bobek, Kacinska and Zapletal, 1980; Garrett, 1980). 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 (Heshmat, Taha, Ismail and Sami, 1984; Wasfi, El Tayeb and El Taher, 1987), none relate to the growing animal. The present study was therefore undertaken to investigate the patterns of change in thyroid hormones in growing male camels.

Eighteen young Majaheem male camels, 6 to 7 months old and weighing 136 to 180 kg, were used in this study. They were kept in a barn on the livestock farm of the animal production department, King Saud University in Riyadh. The animals were allocated by body weight into three groups (G1, G2 and G3). Each group was randomly allotted to receive one of the following roughages: lucerne hay (138 g crude protein (CP) per kg and 10.1 MJ metabolizable energy (ME) per kg dry matter (DM)) to G1, rhodes grass hay (72 g CP per kg and 8.7 MJ ME per kg DM) to G2 and ammonia-treated wheat straw (77 g CP per kg and 8.8 MJ ME per kg DM) to G3. In addition, all groups were given concentrate pellets (187 g CP per kg and 11.7 MJ ME per kg DM) at the rate of 15 g/kg body weight daily. The roughages, salt and water were measured and given ad libitum.

Throughout the study period (16 weeks, from November 1991 through February 1992), all camels were weighed at 2-week intervals, and at the same time blood samples were collected from the jugular vein into 10 ml evacuated heparinized tubes. The blood samples were centrifuged at 3000 g for 20 min and the plasma stored at -20°C for later analysis. Concentrations of thyroxine and triiodothyronine were estimated by a direct solid phase ^{125}I -based radioimmunoassay method (Coat-A-Count TKT3 and TKT4; Diagnostic Products Corporation, Los Angeles, CA, USA) in 25- μl aliquots plasma for T_4 and in 100- μl aliquots plasma for T_3 . All samples were assayed in duplicate using the method described by the manufacturers. The main cross reactivities for the T_4 assay were 100%, 2% and 2% for l-thyroxine, triiodo-l-thyronine and triiodothyroacetic acid, and for the T_3 assay 100%, 0.5% and 0.4% for triiodo-l-thyronine, l-thyroxine and tetraiodothyroacetic acid, respectively. The intra-assay CV were 0.032 and 0.055 and inter-assay CV were 0.082 and 0.076 for the T_4 and T_3 assays, respectively. Data were statistically analysed using a general linear model procedure (Goodnight, Sall and Sarle, 1986). Plasma T_4 and T_3 concentrations, starting body weight and final body weight in

Table 1 Plasma thyroxine (T_4) and triiodothyronine (T_3) concentrations (nmol/l), starting body weight (SBW; kg) and final body weight (FBW; kg) in growing male camels given three different diets

	Lucerne hay		Rhodes grass hay		Ammonia-treated straw	
	Mean	s.e.	Mean	s.e.	Mean	s.e.
No. of animals	6		6		6	
T_4	120.5 ^a	2.80	112.0 ^b	2.79	126.3 ^a	2.83
T_3	2.91 ^a	0.12	2.75 ^a	0.14	3.09 ^a	0.13
SBW	227.2 ^a	10.15	211.7 ^a	10.15	208.6 ^a	10.15
FBW	296.1 ^a	3.38	256.9 ^b	3.38	246.7 ^c	3.38

^{a,b,c} Means in the same row with different superscripts are significantly different ($P < 0.05$).

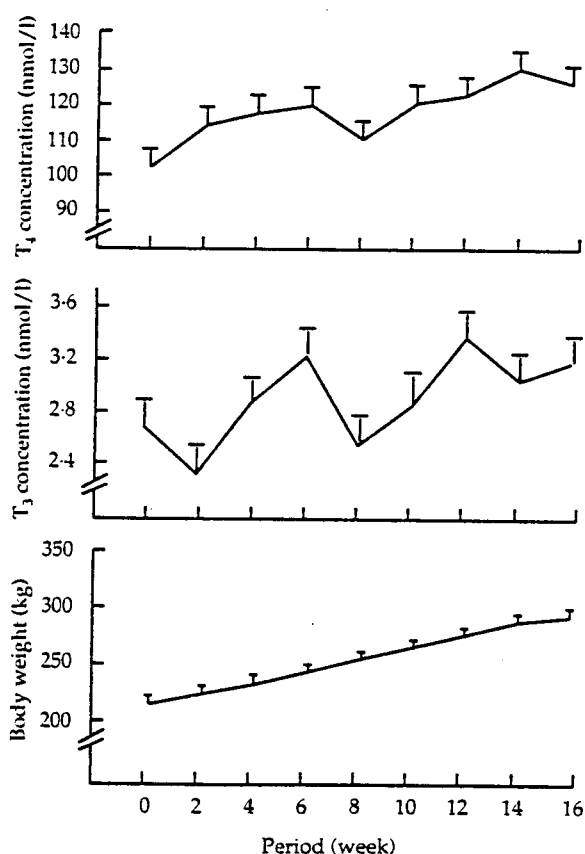


Figure 1 Plasma thyroxine (T_4) and triiodothyronine (T_3) concentrations (nmol/l) and body weight (kg) in growing male camels during the study period.

growing male camels given three different diets are depicted in Table 1. Overall mean T_4 levels were significantly higher in camels given either lucerne hay or straw compared with those given rhodes grass hay (120 or 126 v. 112 nmol/l, respectively), but there were no significant differences in T_3 concentrations among the three groups. Final body weight was significantly higher in camels given lucerne hay compared with those given rhodes grass hay or straw (296 v. 257 or 247 kg, respectively). The levels of T_4 and T_3 and body weight in male camels during the study period are illustrated in Figure 1. Both T_4 and T_3 concentrations and body weight increased throughout the study. However, there was far more fluctuation in mean T_3 level over time compared to T_4 concentrations. T_4 and T_3 concentrations were significantly ($P < 0.01$) correlated with body weight ($r = 0.40$ and 0.29 , respectively) over the study period.

Plasma concentrations of T_4 and T_3 described in this study are within the range of published values for mammalian blood (103 to 129 and 1.5 to 3.0 nmol/l; Falconer, 1984). The results indicate a positive correlation between thyroid hormone levels in plasma and body weight during the growing period. This reaffirmed that the thyroid hormones are important, in part, as regulators of growth. Similarly, Kahl and Bitman (1983) reported a positive correlation between thyroid hormones in plasma and body weight during a period of intensive growth in dairy calves. The greater fluctuation in T_3 may be explained by the fact that T_3 is more potent than T_4 and the latter has to be transformed to T_3 in tissues before it becomes biologically active (Boonnamsiri, Kermodé and Thompson, 1979). The increase in plasma T_4 and growth rates in camels given lucerne hay or straw compared with those given rhodes grass hay may be due to the nutrient values of these diets. In conclusion, measurement of thyroid hormones may play a rôle in determining body weight gain in growing male camels. Obviously, further investigation is needed to study the effect of thyroid hormones on metabolic rate, since the camel lives in a harsh, desert environment that may have an effect on thyroid function.

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