The Relationship Between Ambient Temperature and Levels of Thyroid Hormones in Dallagh Ewes During Spring in Iran

S.R. Hassani[A], Y. Jafari Ahangari[A], F. Moslemipur[B] and M. Ahmadi Hamedani[A]

[A]Department of Animal Sciences, Gorgan University of Agricultural Sciences and Natural Resources, Iran
[B]Department of Animal Sciences, Gonbad Higher Education Centre, Iran

Thyroid hormones, triiodothyronine (T3) and thyroxine (T4), play fundamental roles in the body such as controlling general metabolism and reproduction (Dickson 1996; Billings *et al* 2002). The secretion of these hormones is affected by many factors including sex, age, feed and season. Special attention has been given to the effect of ambient temperature on thyroid activity of sheep in different parts of the world (Webster *et al* 1991), but not among ewes in the climate conditions of Iran. Therefore, the major aim of the present study was to estimate the relationship between ambient temperature and T4 and T3 levels of Iran's native ewes.

Five healthy, mature and fertile Dallagh ewes, approx 3 years of age and weighing 61.2±7.7 kg, were randomly selected from a herd in the north of Iran (latitude 36º9´ N and longitude 54º75´ E). The experiment was conducted under natural conditions in the spring season (April, May and June, 2009). Throughout the experiment, ewes were maintained separately from rams and received a standard maintenance ration, and had unlimited access to water and mineral licks. Blood samples were obtained weekly via jugular vein (between 0800 and 1000 h). Sera were harvested and stored at −20 °C until assay for T4 and T3 via radioimmunoassay.

Throughout the experiment, local daily temperatures (mean, maximum and minimum) were recorded. The greatest and lowest T3 levels were at wk 3 and 11 (3.3 and 1.57 nmol/L, respectively), while those were wk 3 and 10 for T4 (95.2 and 55.16 nmol/L, respectively). Correlation coefficients between T3 and T4 levels and ambient temperature were -0.686 and -0.650, respectively ($p<0.01$).

Table 1. Mean weekly ambient temperature during the experimental period (1 to 12 weeks)

Week	1	2	3	4	5	6	7	8	9	10	11	12
Temperature [°C]	13.5	13.66	13.75	17.1	20.71	19.6	22.48	19.91	22.72	25.37	24.97	27.74

Table 2. Mean concentrations of serum T3 and T4 of ewes during the experiment

Date	11 Apr	18 Apr	25 Apr	2 May	9 May	16 May	23 May	30 May	6 June	13 June	20 June	27 June
T3 [nmol/L]	2.316	2.696	3.132	2.606	2.108	1.706	1.728	1.99	1.898	1.652	1.574	1.656
T4 [nmol/L]	80.42	88.1	95.2	85.16	74.34	67.58	62.96	66.22	59.5	55.16	59.38	64.82

Results indicated that ambient temperature has a marked negative-related effect on thyroid hormones. Consequently, with increasing ambient temperature during spring, thyroid hormones level declined in Dallagh ewes.

Dickson W.M. (1996). Endocrine Glands. *In* "Physiology of Domestic Animals", (ed. Duke) p571 (Guanabara Koogan, Rio de Janeiro).

Billings H.J., Viguie´ C., Karsch F.J., Goodman R.L., Connors J.M. and Anderson G.M. (2002). *Endocrinology* **143,** 2618.

Webster J.R., Moenter S.M., Woodtill C.J.I. and Karsch F.J. (1991). *Endocrinology* **129**, 176.

Email: yjahangari@yahoo.co.uk