EFFECT OF THYROXINE, CORTISOL AND EPIDERMAL GROWTH FACTOR ON FIBRE GROWTH *IN VITRO*

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The recent development of a wool follicle culture system (Hynd *et al.* 1992) now allows us to determine the direct effects of hormones and growth factors on follicle function. The effects of thyroxine (T_4), triiodothyronine (T_3), and cortisol, which are known to have large effects on fibre growth when manipulated systemically, were examined using the *in vitro* system. The opportunity was also taken to examine the effects of very low concentrations of epidermal growth factor (EGF) on fibre growth.

Follicles (n = 12/treatment) were dissected from thin strips of skin taken from Tukidale sheep and cultured in 500 μL of Williams E media in individual wells. Hormone or growth factor was added daily to the cultures in 20 μL of media for a period of 4 days. Follicle length was measured daily by image analysis at 100x magnification. Fibre growth rate was estimated as the slope of the regression of follicle length on time. The treatments were: Control, T_3 (5 ng/mL), or T_4 (100 ng/mL) in media supplemented with 5% fetal calf serum (FCS) or zero FCS; Cortisol at 0, 10, 50 or 1000 ng/mL; and EGF at 0, 0.125, 0.25, 1.0, 25.0 and 50.0 ng/mL.

Neither T_3 nor T_4 had any significant effect on fibre growth in *vitro* (Table 1). Addition of 5% FCS also had no significant effect although there was a tendency for FCS-treated follicles to grow slightly (18%) faster (P = 0.10) than follicles incubated in zero FCS. There was no significant interaction between FCS and thyroid hormone response (P = 0.69). Cortisol likewise had no significant effect on fibre growth (399 ± 57, 440 ± 57, 446 ± 54 and 367 ± 52 μm/day (P = 0.72) for the 0, 10, 50, and 100 ng/mL treatments respectively). The EGF at concentrations greater than 0.25 ng/mL significantly (P = 0.009) reduced fibre growth (Table 2).

Table 1. Mean (± se) effects of T_3 and T_4 on fibre growth (μm/day) *in vitro* with and without foetal calf serum (FCS)

Treatment					
-FCS	-FCS + T_3	-FCS + T_4	+FCS	+FCS + T_3	+FCS + T_4
422 (28)	447 (33)	398 (44)	494 (70)	479 (85)	529 (62)

No significant effect of FCS (P = 0.10) or thyroid hormones (P = 0.99) on fibre growth.

Table 2. Mean (± se) effect of epidermal growth factor (EGF) dose on fibre growth @m/day) *in vitro*

EGF concentration (ng/mL)						
0	0.125	0.25	0.5	1.0	25	50
479 (73)^{a}	313 (88)^{ab}	351 (73)^{ab}	154 (50)^{b}	198 (68)^{b}	217 (45)^{b}	202 (42)^{b}

Different superscripts signify P < 0.05 in Duncan's New Multiple Range test.

The inhibitory effects of EGF confirm previous findings but the lack of effect of the thyroid hormones and cortisol was unexpected. It appears these hormones do not act directly on the follicle.

HYND, P.I., WINDER, L.M., JAHODA, C.A.B. and BICKERSTAFFE, R. (1992). *Wool Technol. and Sheep Breed. 40:* 102-5.