

RAPID CHANGES IN WOOL GROWTH AND NITROGEN RETENTION DUE TO  
CHANGES IN PROTEIN DIGESTION

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Wool growth by sheep grazing Mediterranean pastures can decrease by 60% within 30 days at the end of spring coinciding with pasture wilting (Purser 1980). Wool growth is proportional to the amount of non-ammonia nitrogen (NAN) digested by the animal. NAN digestion can decrease by 45% once the pasture has wilted (Hume and Purser 1974). We aimed to determine accurately when wool growth begins to decrease and the rate of the decrease under these conditions. In an animal house experiment to mimic the change in nitrogen (N) digestion at wilting we varied both the amount of protein available for digestion and dry matter (DM) intake.

Twelve sheep were allocated to three groups on the basis of live weight. Casein was infused into the abomasum of all sheep at the rate of 90 g/day for 10 days. Group A was fed *ad libitum* and group B was fed to maintain live weight throughout the experiment. Group C was fed *ad libitum* prior to, and during the casein infusion, and when the casein infusion was stopped feed intake was restricted to maintain live weight. This regime was designed to mimic the intake by grazing sheep at wilting. Wool growth and nitrogen retention were measured over 5-day intervals during and after the casein infusion; the wool measurements were made using an autoradiographic technique. All sheep were fed a hay-based diet with a nitrogen content of 1.2% of DM.

Table 1 Nitrogen retention and wool fibre growth (s.e. in parenthesis)

Days:	Nitrogen retention (g N/day)				Wool fibre growth (um/day)			
	Casein infusion 1-5	Post-infusion 6-10	Post-infusion 11-15	Post-infusion 16-20	Casein infusion 1-5	Post-infusion 6-10	Post-infusion 11-15	Post-infusion 16-20
A ( <i>ad lib.</i> )	6.3 (0.52)	6.4 (0.64)	-0.2 (1.00)	1.0 (0.53)	425 (14.8)	442 (20.4)	405 (22.0)	391 (24.9)
B (maint.)	5.8 (0.78)	7.7 (0.70)	-1.3 (0.36)	0.8 (0.47)	418 (17.2)	436 (19.5)	406 (18.0)	365 (23.7)
C ( <i>ad lib.</i> maint.)	5.5 (0.68)	6.6 (1.23)	-3.6 (0.62)	0.5 (0.31)	417 (27.9)	424 (33.2)	378 (29.6)	355 (26.7)

When the casein infusion ceased, nitrogen retention changed from a net gain to a net loss and wool growth decreased. Immediately after the casein infusion (days 11-15) the net loss of nitrogen for sheep in Group C was three times greater than in the others. The decrease in wool growth was greater also. Therefore, a reduction in feed intake at the same time as a depression in protein digestion appears to exacerbate the decrease in wool growth primarily because of a greater decrease in nitrogen retention.

The immediate response in wool growth in this experiment suggests that the decrease in wool growth in the field at pasture wilting is likely to occur in less than 30 days. This is a consequence of a decrease in both intake and nitrogen content of the pasture. These relationships are being examined in a field experiment.

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