RELATIVE IMPORTANCE OF AMINO ACIDS AND ENERGY FOR WOOL GROWTH

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The relative importance for wool growth of energy-yielding nutrients compared with amino acids required for incorporation into wool proteins was assessed in an experiment in which most nutrients were supplied via the abomasum. Previous studies (Reis 1969; Kempton 1979) have indicated that the major nutritional limitation to wool production is the amount and composition of amino acids available to wool follicles, but Black et al. (1973) obtained evidence for an interaction between protein and energy supply in sheep receiving all their nutrients via the abomasum.

Nine nutritional treatments, providing three levels of protein to the intestines at three levels of energy (see Table), were given to 12 Merino sheep during three consecutive periods of 3 weeks in a balanced lattice design. Each treatment included a small amount of roughage calculated to provide 15 g digestible protein and 1.85 MJ of digestible energy to the intestines. The remainder of the nutrients consisted of varying proportions of casein, whole milk, glucose and glycerol given via the abomasum as continuous infusions, plus trace elements and vitamins.

There was a large effect of protein supply on wool growth ($P<0.001$), but there were no significant effects of energy. The Table shows the mean wool growth, adjusted for sheep differences, for the three levels of protein and energy. Wool growth was measured over the last 12 d (mass), or 5 d (other components), of each period. There was a significant interaction ($P<0.01$) between protein and energy effects on length growth of wool, but it was small relative to the main effect of protein. In agreement with the findings of Black et al. (1973), extra energy appeared to enhance both mass and volume of wool at the highest level of protein, but the effect was not significant. This result might be expected if there was reduced catabolism of amino acids to provide energy. This experiment confirms the major role of amino acid supply in controlling wool growth and indicates that there may be some interaction with energy supply.

Protein (P: g/d) or energy (E: MJ/d)	Wool growth			
	Mass (g/d clean)	Fibre diameter (μm)	Fibre length (μm/d)	Fibre volume $x10^{-3}$ (μm^3/d)
P: 55	7.2	22.5	328	136
101	10.3	24.6	374	185
147	10.5	25.3	390	206
E: 5.2	9.1	24.0	361	176
7.5	9.3	24.2	366	176
9.7	9.6	24.2	364	176

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