

PROTEIN OR AMINO ACID SUPPLEMENTATION OF GRAZING LAMBS

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The results of three experiments to investigate the liveweight gain or N balance response of lambs grazing high quality temperate pasture to extra protein or amino acids are presented. In experiment 1 lambs (Dorset Down*Coopworth, 14 kg W) grazed either fescue or white clover at high pasture allowances for 7 weeks. On both pastures one group (n=8) was a control group, another group (n=8) was supplemented with 3.25 g fishmeal DM/kg W/d calculated to supply 0.28 g protein N/kg W/d to the intestines which equates approximately to the protein lost in the rumen. A further group (n=8) on white clover received protected methionine and lysine supplements, 52 mg MET + 82 mg LYS/kg W/d. Protein content of fescue was ca.20% and white clover ca.30%. In experiment 2, lambs (n=8, Dorset Down*Coopworth, 39 kg W) were housed in metabolism pens and fed fresh ryegrass/white clover pasture. They were infused via the duodenum with casein (800 mg casein N/kg W^{0.75}/d) or equivalent amounts of the 4 amino acids (methionine, lysine, histidine and arginine) found in the casein supplement. N balance was recorded. Protein content of the pasture was ca.20%. In experiment 3, lambs (Dorset Down*Coopworth, 17 kg) fitted with abomasal catheters grazed white clover at high pasture allowances for approximately 10 weeks. One group (10) was infused with water (control), another group (n=10) was infused with whey protein (Alacen312 NZ Dairy Board; 0.37 g protein N/W/d and the third group (n=10) infused with a mixture of amino acids at a rate equal to that supplied in the protein supplement viz. 50.6 mg MET, 227.7 mg LYS, 48.3 mg HIS, 66.7 mg ARG, 50.6 mg CYS and 126.5 mg THR/kg W/d. Protein content of white clover was ca.30%.

TABLE 1. The live weight gain (g/d) (Experiments 1 and 3) or N balance (Experiment 2) (g/W^{0.75}/d) response of lambs to extra protein or amino acids. Different notation depicts a significant difference (P<0.05) within diets.

Exper i - ment	Diet	Treatment				
		Control	Protein	M+L	M+L+H+A	M+L+H+A+C+T
1	Fescue	201a	266b	---	---	---
	White clover	331a	388b	350ab	---	---
2	Ryegrass/White clover	0.431a	0.845b	---	0.586a	---
3	White clover	326a	374b	---	---	379b

These three experiments demonstrate conclusively that animals grazing high quality temperate grasses or legumes and achieving high live weight gains (>200g/d) will respond to extra protein reaching the small intestine. The level of protein needed to elicit the response was approximately equal to the net loss in protein passage to the intestines and indicates that significant production responses could be obtained by addressing this issue in plant selection or genetic engineering programs. The amino acid supplements clearly show that a mixture of 6 amino acids gave the same response as a protein supplement yet 4 or less amino acids (MET, LYS, HIS, ARG) did not give any tangible live weight gain response. Current efforts at increasing just the S amino acid content of plants or microbes would not appear to result in tangible live weight gain responses of lambs grazing these temperate pastures.

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