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Effects of breed and stage of growing season on the metabolic profile of sheep grazing moorland

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Introduction Previous studies have shown that the diet of sheep grazing heather moorland is affected by season (Grant *et al.*, 1987) and the proportion of *Calluna vulgaris* cover (Osoro *et al.*, 2000). In order to investigate the impact of these factors on the associated nutrient supply of animals grazing heathland, blood samples were taken to monitor the metabolic status of different breeds of sheep at different stages of the growing season when grazing sites with different proportions of heather cover.

Material and methods Experimental sites with low (0.08) and medium (0.36) proportions of heather (*Calluna vulgaris*) cover were grazed over two successive years by two breeds of sheep, Scottish Blackface (SB) and Welsh Mountain (WM). Each year blood samples were collected from six non-productive ewes of each breed with similar body condition scores during two experimental periods, at the middle (July) and end (October) of the growing season, and analysed to determine plasma concentrations of β -hydroxybutyrate (BHB) and glucose, and serum concentrations of non-esterified fatty acid (NEFA), total protein, albumin and urea.

Results The metabolic profiles of the two sheep breeds when grazing the different swards is summarised in Table 1. There were more significant effects of season on metabolite profiles in animals grazing the low heather content sward than on the medium heather sward, in particular for the non-glucose energy metabolites, which may be caused by a greater effect of season on grass nutritional composition than on heather composition. Plasma total protein concentrations were significantly higher in October than in July for sheep on both swards. Plasma urea concentrations were consistently higher in WM than SB sheep on both sward types, which could indicate differences in diet selection between the two breeds, leading to lower dietary protein intakes by SB sheep, higher utilisation of endogenous nitrogen sources by the WM, or a combination of the two.

Table 1 Effects of breed and stage of growing season on metabolic profiles of sheep (WM, Welsh Mountain and SB, Scottish Blackface) grazing heathland with low and medium heather cover. There were no significant season \times breed interaction effects

Heather cover	Metabolite	July		October		s.e.d.	Significance	
		SB	WM	SB	WM		Season	Breed
Low	Glucose (mmol/l)	3.85	3.52	3.65	3.72	0.228	ns	ns
	BHB (mmol/l)	0.262	0.307	0.383	0.328	0.0379	*	ns
	NEFA (mmol/l)	648	861	552	520	114.2	*	ns
	Total protein (g/l)	72.4	70.2	78.3	77.8	1.91	***	ns
	Albumin (g/l)	29.9	30.0	31.4	29.4	1.39	ns	ns
	Urea (mmol/l)	3.87	4.58	4.53	6.92	0.674	**	**
Medium	Glucose (mmol/l)	4.13	4.13	3.52	3.57	0.288	**	ns
	BHB (mmol/l)	0.378	0.415	0.405	0.333	0.0399	ns	ns
	NEFA (mmol/l)	317	436	204	404	78.5	ns	**
	Total protein (g/l)	69.3	68.5	73.6	70.7	1.76	*	ns
	Albumin (g/l)	34.5	33.4	33.4	33.0	1.05	ns	ns
	Urea (mmol/l)	2.27	3.07	2.3	3.23	0.362	ns	**

Conclusions Differences in plasma energy and protein metabolites indicate that the diet consumed influenced nutrient absorption. These results, together with corresponding diet selection and intake data, will be used to quantify the consequences of different foraging strategies.

References

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