

PRODUCTIVITY AND MAMMARY UPTAKE OF NUTRIENTS IN COWS FED RYE-GRASS OR CLOVER

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Milk production is higher for cows fed white clover (WC, *Trifolium repens*) than rye-grass (RG, *Lolium perenne*) despite similar digestibilities of organic matter (Beever *et al.* 1985). In previous studies with cows in late lactation (Moate *et al.* 1987) increased milk production was associated with large differences in feed intake, apparent differences in rumen digestion and possibly differences in nutrient partition/utilisation. The present study with cows in early lactation was conducted to gain further information on the bases for differences in productivity of cows fed WC and RG.

Four sets of identical twin dairy cows (Friesian or Friesian cross-breds) which had been lactating for c. four months were kept indoors and offered similar amounts of freshly-chopped WC or RG - one of each twin pair per forage. They had been fed respective forages for 8-10 weeks before the experiment commenced and were fed at c. 0800 and 1600 hours each day. Each cow was fitted with polyvinyl chloride catheters in a deep femoral artery (A) and in a subcutaneous mammary vein (M) to allow measurement of arterio-venous differences (A-M) of key metabolites, insulin and growth hormone (GH). Seven days after insertion of catheters these measurements were made on pooled blood samples collected between 1100 and 1300 hours. Feed intake, milk yield and milk composition were also measured. Mean values for all parameters are shown.

		RG	WC		RG	WC
feed intake†	(kg/d)	11.7	15.6**	plasma insulin	(mU/l)	36.9 49.8
milk yield	(kg/d)	12.9	17.9**	plasma GH	(µg/l)	6.0 2.4**
milk fat	(g/kg)	37.4	40.3	plasma glucose	A	3.10 3.31
	(g/d)	478	717**		A-M	0.65 0.00
milk protein	(g/kg)	27.5	28.6	plasma acetate	A	2.44 3.66*
	(g/d)	359	507**		A-M	1.25 2.20
milk lactose	(g/kg)	48.2	49.3	plasma FFA	A	332 318
	(g/d)	620	880**		A-M	81 85
† dry matter				plasma 3-OH-	A	1.15 1.69*
difference between mean values				butyrate	(mM) A-M	0.63 0.50
are significant; *P<0.10				plasma arginine	A	100 198**
**P<0.05					(µM) A-M	33 40

Cows fed WC consumed considerably more dry matter than those fed RG and the difference was more than sufficient to explain the increased production of milk, and milk constituents. Arterial concentrations of key metabolites were higher for cows fed WC than RG, corresponding with increased feed intakes. The higher insulin and lower GH for cows fed WC than RG also correlate with differences in feed intake. Higher acetate and 3-OH-butyrate concentrations in A may correlate with differences in rumen fermentation of WC and RG.

It appeared that the increased productivity of cows fed WC was due to the higher dry matter intake and/or a better balance of nutrients absorbed from the digestive tract. Differences in nutrient partition associated with diet were not demonstrated.

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