The use of forage supplements to overcome seasonal shortages of grazed herbage in dairy production systems

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Introduction In most dairy production systems, grazed herbage is potentially the cheapest forage resource. However, while the availability is affected by seasonal changes in herbage growth, and/or between year variations in climatic conditions, the requirements of dairy production systems tend to remain constant throughout the season. This paper summarises five experiments that examined the effect of the characteristics of the forage supplement (dry matter, DM; metabolisable energy, ME, content; Type) and the effect of stage of lactation and access method to the supplement on animal performance.

Materials and methods Five experiments were carried at Crichton Royal Farm, Dumfries, UK, between 1992-1997 and involved between 20 to 48 Holstein Friesian dairy cows per experiment, using a continuous design and experimental periods of 4-5 weeks (see Table 1 for treatments). Animals grazed predominantly perennial ryegrass swards (*Lolium perenne*), using a continuous grazing system, with a sward surface heights of between 6 and 12 cm. Animals were milked twice daily. In four studies, the animals had access to the forage supplements for one hour after each milking in a feed passage in separate treatment groups. In the fifth experiment the animals had access to the forage supplement either twice daily after milking, continuously in the grazing area, or were housed overnight with access to the forage supplement. Animal performance was recorded and herbage and forage supplement intake were estimated using the *n-alkane* technique.

Results As shown in Table 1 increasing DM-content of the forage supplement from 30% to 80 % did not affect supplement or total forage intake, while increasing the ME content of the forage supplement from 8.4 to 10.4 MJ/kg DM increased supplement intake, although total forage DM intake and corresponding production responses were unaffected. Both early- and late-lactation animals consumed the same amount of forage supplement but total DM intake was different. Comparing precision-chopped grass silage with big-bale grass silage and maize silage showed no significant differences in supplement intake, total forage intake and production. When comparing access method, it was found that twice-daily access resulted in the lowest supplement intake and that overnight access resulted in the highest forage supplement intake. However, no significant differences in terms of overall animal performance were observed as a result of access method.

Table 1 Effects of different supplement treatments on intake and milk yield

	Treatments			SED
DM of straw mixture	303 g/kg	541 g/kg	798 g/kg	
Milk yield (kg/d)	21.7	22.3	23.2	1.23
Total intake (kgDM/d) *	12.5 (4.5)	15.0 (4.7)	14.4 (5.5)	1.15 (0.679)
Stage of lactation (days after calving)	Early (71.8 ± 3.95)	Late (218.5 ± 17.1)		
Milk yield (kg/d)	26	18.2		0.58**
Total intake (kgDM/d) *	15.5 (3.7)	12.9 (3.6)		0.67** (0.533)
ME content supplement	10.4 MJ/kgDM	8.4 MJ/kgDM		
Milk yield (kg/d	25.0	23.3		1.17
Total intake (kgDM/d) *	16.9 (5.3)	16.7 (2.3)		1.01 (0.511)
Supplement type	Maize silage	Big bale silage	Precision-chopped silage	
Milk yield (kg/d)	33.3	32.8	34.1	2.37
Total intake (kgDM/d) *	19.7 (1.3)	19.7 (1.8)	22.2 (2.3)	1.31 (0.57)
Access Method	Twice daily	Overnight	In field	
Milk yield (kg/d)	36.1	37.4	36.6	1.03
Total intake (kgDM/d) *	21.4 (1.6)	22.4 (5.4)	22.5 (2.4)	1.54 (0.671)

* Value between brackets represents forage supplement intake ** $p<0.01$

Conclusions Forage supplementation can be used to overcome seasonal shortages of forage supply and the characteristics of the forage supplement or access method can be used to manipulate forage supplement intake, but this does not result in differences in milk yield.