

The effects of maize and whole crop wheat silages and quality of grass silage on the performance of lactating dairy cows

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Introduction Patterson *et al.* (2004) obtained positive milk production responses to the inclusion of maize silage in grass silage-based diets under Northern Ireland conditions. By contrast, while inclusion of fermented whole crop wheat increased total forage intake, it had no significant effect on milk production of dairy cows. More recently, a newer technique has been developed of harvesting the wheat crop at high DM content, with milling of the grain during harvesting and treatment with an urea/urease mixture at ensiling (alkalage treatment). The aim of the present study was to investigate the milk production potential of high DM whole crop wheat as a partial replacement for grass silage.

Material and methods The feeding study (2x5 factorial design) was based on two qualities (medium and high) of grass silage (GS) offered as the sole forage with either 7 or 10 kg concentrates/d, or as a 50:50 DM mixture of grass silage with forage maize silage (MS), fermented whole crop wheat silage (FW) or high DM urea/urease-treated milled whole crop wheat (UW). The forages were offered *ad libitum* and forage mixtures were supplemented with 7 kg concentrates/d. The medium and high quality grass silages had: DM of 185 and 234 g/kg respectively and ME of 10.7 and 12.5 MJ/kg DM respectively. The MS, FW and UW had DM; 305, 459 and 751 g/kg, and starch; 359, 350 and 420 g/kg DM. The 10 dietary treatments were offered to 40 lactating dairy cattle in a partially balanced, changeover design consisting of 2 periods each of 5 weeks, with the final 2 weeks of each period being used as the main recording period. The forages were mixed in a diet mixer and individual intakes were recorded. The concentrate was offered separately through out-of-parlour feeders. The results were subjected to statistical analysis using the REML technique in Genstat 5.

Results There were no significant forage type x quality of grass silage interactions, and main treatment effects are presented in Table 1. The high quality grass silage significantly increased both silage intake and performance. FW, UW and MS produced major proportionate increases in forage DM intake of 0.25, 0.29 and 0.39 respectively, but only MS produced a significant increase in milk yield. However, the ratio milk energy output/total forage intake was similar for all of the alternative forage mixtures, and was significantly lower than for the low concentrate grass silage treatment.

Table 1 The effects of forage treatment and concentrate level on performance

	Forage type					SED	Sig	Grass silage			
	GS Low conc.	GS High conc.	FW	UW	MS			Med. quality	High quality	SED	Sig
Forage DMI (kg/d)	9.80 ^a	8.93 ^a	12.25 ^b	12.60 ^b	13.58 ^c	0.437	***	10.37	12.49	0.242	***
Total DMI (kg/d)	15.88 ^a	17.45 ^b	18.37 ^{bc}	18.64 ^c	19.61 ^d	0.446	***	16.97	19.01	0.248	***
Milk yield (kg/d)	28.5 ^a	30.5 ^b	29.6 ^{ab}	28.7 ^a	30.9 ^b	0.76	**	27.9	31.5	0.43	***
Fat (g/kg)	39.9	39.1	39.0	39.5	40.3	1.34	NS	40.7	38.5	0.73	**
Protein (g/kg)	30.6	32.0	32.0	32.0	32.2	0.64	NS	30.8	32.8	0.36	***
Fat+protein yield (g/d)	1989 ^d	2129 ^b	2053 ^{ab}	2057 ^{ab}	2236 ^b	66.0	**	1961	2224	37.2	***
Milk energy output/total forage DMI (MJ/kg)	8.80 ^b	11.01 ^c	7.36 ^a	7.20 ^a	7.25 ^a	0.534	***	8.08	7.84	0.337	NS

Conclusions The alternative forages produced significant increases in total forage intake but only maize silage increased milk yield. The concentrate sparing effects of FW, UW and MS relative to grass silage only were 1.3, 1.4 and 5.0 kg/d on a fat plus protein basis.

References

Patterson, D.C., D.J. Kilpatrick & T.W.J. Keady (2004). The effects of maize and whole crop silages on the performance of lactating dairy cows offered two levels of concentrates differing in protein concentration. *Proceedings of the British Society of Animal Science*, p. 4.