

The feeding value of conserved whole-crop wheat and forage maize relative to grass silage and *ad-libitum* concentrates for beef cattle

K. Walsh^{1,2}, P. O'Kiely¹ and F. O'Mara²

¹Teagasc, Grange Research Centre, Dunsany, Co. Meath, Ireland, Email: kwalsh@grange.teagasc.ie, ²Faculty of Agri-Food and the Environment, University College Dublin, Belfield, Dublin 4, Ireland

Keywords: cattle, maize, whole-crop wheat, silage, *ad-libitum* concentrates

Introduction Grass is the predominant forage ensiled in Ireland. However, the relatively modest yields achieved in a single harvest allied to variability in digestibility and ensilability (and thus in intake and animal performance response) and the likelihood of effluent production create disadvantages for grass silage compared to the potential of some alternative forage crops. Thus, alternative forages are worthy of consideration on many farms. The objectives of this study were to quantify the relative intake, digestibility and performance of beef cattle offered grass silage, forage maize silage and whole-crop wheat (fermented or urea-treated), rank these relative to cattle offered an *ad libitum* concentrate-based diet and compare the “alkalage” system of urea-treated processed whole-crop wheat with whole-crop wheat silage.

Materials and methods Seventy continental cross-bred beef steers, mean initial live weight 424 (sd 33.0) kg, were blocked for live weight and breed and allocated to one of 5 dietary treatments in a randomised complete block design. Treatments were grass silage (GS), maize silage (cv. Benecia) (MS), fermented whole-crop wheat (cv. Soissons) (FWCW), alkalage whole-crop wheat (cv. Soissons) (ALK) and *ad libitum* concentrates (ALC). The four forages were precision-chop harvested. The ALK harvester was fitted with a grain processor and ensiled with 45 kg Home 'N' Dry (Volac International Ltd.)/t DM. Forages were offered *ad libitum* through individual Calan gates and supplemented with 3 kg concentrates/head/d. The ALC treatment was supplemented with 5 kg grass silage/head/d throughout the 160-d trial period. The mean DM (g/kg) (uncorrected for volatiles) of the GS, MS, FWCW and ALK were 161, 303, 391 and 705 respectively. *Ad libitum* concentrate composition was 830 g rolled barley, 100 g soya-bean meal, 50 g molasses and 20 g minerals and vitamins/kg (DM 838 g/kg) and the concentrate supplement was 650 g rolled barley, 280 g soya-bean meal, 50 g molasses and 20 g minerals and vitamins/kg (DM 839 g/kg). Live weight was recorded every 3 weeks and starting and finishing live weight calculated as the mean of two consecutive day's weighings. Blood samples were taken from all animals mid-way through the experiment. The data were analysed using analysis of variance taking account of diet and block.

Results Total DM intake and carcass growth were lowest for GS ($P<0.001$) (Table 1). Relative to ALC, GS, FWCW and ALK had a poorer ($P<0.05$) FCE, lower live weight ($P<0.05$) and carcass ($P<0.01$) gain and a poorer ($P<0.05$) kill-out proportion. Despite ALK having the highest ($P<0.05$) forage DM intake, kill-out proportion and rate of carcass gain were lower ($P<0.05$) than MS. MS had a better FCE than the ALK ($P<0.001$) or the FWCW ($P<0.05$). Plasma urea concentration was lowest for MS and highest for ALK ($P<0.001$).

Table 1 Feed DM intake, growth, kill-out proportion, feed conversion efficiency (FCE) and plasma urea

	GS	MS	FWCW	ALK	ALC	s.e.m.	Sig.
Forage DM intake (kg/d)	4.54 ^c	6.75 ^b	7.07 ^b	7.56 ^a	0.95 ^d	0.166	***
Total DM intake (kg/d)	7.07 ^c	9.27 ^b	9.59 ^{ab}	10.06 ^a	9.86 ^a	0.194	***
Liveweight gain (g/d)	802 ^c	1200 ^{ab}	1149 ^b	1132 ^b	1302 ^a	48.3	***
Carcass gain (g/d)	479 ^d	776 ^{ab}	723 ^{bc}	686 ^c	851 ^a	30.9	***
Carcass weight (kg)	290 ^c	335 ^{ab}	329 ^b	321 ^b	348 ^a	5.2	***
Kill out (g/kg)	523 ^d	547 ^{ab}	539 ^{bc}	532 ^{cd}	551 ^a	4.2	***
FCE ¹	15.2 ^a	12.1 ^c	13.5 ^b	14.8 ^{ab}	11.9 ^c	0.5	***
Plasma urea (mmol/l)	4.6 ^b	2.7 ^c	5.0 ^b	6.8 ^a	4.9 ^b	0.21	***

¹(kg DM intake/kg carcass gain)

Within row, means with the same superscripts are not significantly different ($P>0.05$), *** $P<0.001$

Conclusions Forage maize and whole crop wheat silages supported superior levels of growth by cattle compared to grass silage (*in vitro* DMD 698 g/kg). The FCE with maize silage and *ad libitum* concentrates were greater than for the other forages. There was no animal productivity advantage with alkalage compared to fermented whole-crop wheat.