

An evaluation of the inclusion of alternative forages with grass silage-based diets on carcass composition and meat quality of beef cattle offered two contrasting grass silages

T.W.J. Keady^{1,2,3}, F.O. Lively¹, D.J. Kilpatrick^{2,3} and B.W. Moss^{2,3}

¹Agricultural Research Institute of Northern Ireland, Hillsborough, Co. Down BT26 6DR, U.K, Email: tim.keady@dardni.gov.uk, ²Department of Agriculture and Rural Development for Northern Ireland, Newforge Lane, Belfast BT9 5PX, ³The Queen's University of Belfast, Newforge Lane, Belfast BT9 5PX

Keywords: maize, whole crop wheat, beef cattle, meat quality

Introduction Recent studies have shown that the inclusion of some alternative forages with grass silage-based diets can increase animal performance of beef cattle. The aim of the present study was to evaluate the effects of including either maize or whole crop wheat (WCW) silages with grass silage-based diets on meat quality of beef cattle offered two levels of concentrate.

Materials and methods Grass silage was offered either as the sole forage or in addition to either maize or WCW silages at a ratio of 40:60 alternative forage:grass silage and supplemented with either 3 or 5 kg concentrate/head/d. The six treatments were offered to 66 continental cross beef cattle (mean initial live weight 523 (sd 37.2 kg) in a continuous design, randomised block experiment. The forages were offered *ad libitum* following mixing in a diet wagon once per day, whilst the concentrate was offered in two equal feeds daily. Carcasses were hung tenderstretch and were chilled under standard commercial conditions. The methods used for meat quality assessment are described by Keady *et al.* (2005).

Results Animal performance data from this study have been presented by Keady *et al.* (2005). The main effects of alternative forage and concentrate feed level on meat quality and carcass composition are presented in Table 1. Inclusion of maize silage increased ($P < 0.05$) carcass weight and daily carcass gain. Inclusion of either maize or WCW did not alter ($P > 0.05$) fat colour, lean colour, pH, sarcomere length, cooking loss or Warner Bratzler shear force (WBSF). Increasing concentrate feed level increased lean a*, b* and Chroma, and sarcomere length. Otherwise concentrate feed level did not alter ($P > 0.05$) fat colour, pH, cooking loss or WBSF.

Table 1 Effects of forage type and concentrate feed level on fat and lean colour and meat quality

	Forage (F)			Sem	Concentrate (kg/d) (C)		Sem	Significance [†]	
	Grass	Grass + maize	Grass + WCW		3	5		F	C
Animal performance									
Carcass weight (kg)	326 ^a	334 ^b	325 ^a	3.0	326	331	2.4	*	NS
Carcass gain (g/d)	514 ^a	602 ^b	496 ^a	31.4	515	560	25.6	*	NS
Fat colour									
L*	71.4	71.9	72.6	2.07	73.9	70.0	1.69	NS	NS
a*	5.7	7.1	5.5	1.01	5.7	6.5	0.83	NS	NS
b*	16.6	17.9	17.9	0.89	17.3	17.6	0.72	NS	NS
Chroma	17.9	19.5	18.8	1.11	18.5	18.9	0.90	NS	NS
Hue	71.7	69.6	73.7	2.47	73.0	70.4	2.01	NS	NS
Lean colour									
L*	42.2	40.7	41.4	0.87	41.0	41.9	0.71	NS	NS
a*	20.7	21.4	20.9	0.51	20.0	22.0	0.42	NS	**
b*	15.9	16.2	15.9	0.37	15.4	16.6	0.31	NS	*
Chroma	26.1	26.8	26.3	0.59	25.2	27.6	0.48	NS	**
Hue	37.6	37.2	37.4	0.52	37.6	37.2	0.43	NS	NS
PH	5.57	5.56	5.55	0.011	5.56	5.56	0.009	NS	NS
Sarcomere length (µm)	2.28	2.29	2.34	0.055	2.23	2.38	0.050	NS	*
Cooking loss (%)	26.2	26.5	26.1	0.97	26.1	26.4	0.79	NS	NS
WBSF (kg/cm ²)	1.99	2.07	2.00	0.172	2.06	1.98	0.141	NS	NS

There were no significant ($P > 0.05$) forage type x concentrate interactions.

Conclusions It is concluded that whilst the inclusion of forage maize with grass silage-based diets increased animal performance, inclusion of either maize or WCW did not alter fat or lean colour or meat quality. However increasing concentrate feed level altered lean colour and increased sarcomere length.

References

Keady, T.W.J., F.O. Lively, D.J. Kilpatrick & B.W. Moss (2005). Effects of replacing grass silage with either maize or whole crop wheat silages on the performance and meat quality of beef cattle offered two levels of concentrates. *Journal of Animal Science* (Submitted for publication).