

An evaluation of grain processing and storage method, and feed level on the performance and meat quality of beef cattle offered two contrasting grass silages

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Introduction Traditionally cereals have been dried or treated with propionic acid and processed prior to feeding to finishing beef cattle. Recently new techniques have been developed for storing and feeding grain to beef cattle. The objective of the current study was to evaluate the effects of grain storage and processing method, and grain feed level on performance and meat quality of beef cattle offered two contrasting feed value grass silages.

Materials and methods The study involved a total of 132 continental cross beef cattle, which were allocated to 12 treatments in a continuous design, randomised block experiment. High and low feed value silages were supplemented with either 3.5 or 5.9 kg concentrate dry matter/head/d. The concentrate consisted of 850 g/kg dry matter (DM) wheat and 150 g/kg DM citrus pulp. Wheat was harvested and ensiled either crimped and treated with 4.5 l/t fresh weight of a proprietary acid-based additive, ensiled whole mixed with 20 kg urea and 30 l of water/t fresh weight or harvested conventionally and treated with propionic acid. Cattle were slaughtered and meat quality assessments were undertaken after 7 days ageing and are detailed by Keady *et al.* (2005). Data were analysed as 3 (grain storage/processing methods) x 2 (grain feed levels) x 2 (grass silage feed values) experiment.

Results The effects of grain processing/storage method, grain feed level and grass silage feed value on animal performance and meat quality are presented in Table 1. Urea treatment increased silage and total DM intake, and cooking loss, and tended to decrease ($P=0.09$) carcass gain. Increasing silage feed value increased ($P<0.05$ or greater) feed intake, final live weight, carcass weight, liveweight gain, carcass gain, fat classification and kill out proportion. Increasing grain feed level increased ($P<0.05$ or greater) total DM intake, final live weight, carcass weight, liveweight gain, carcass gain and conformation. Grain processing method, silage feed value or grain feed level did not alter ($P>0.05$) ultimate pH, sarcomere length, lean L*, a* and b*, or fat L*, a* and b*.

Table 1 Effect of grain storage and processing method, and feed level and silage feed value on feed intake and animal performance

	Processing method (PM)				Silage feed value (SIL)		Grain feed level (GFL)		Sem	Significance ¹		
	Conventional	Urea	Crimped	Sem	Low	High	Low	High		PM	SIL	GFL
SDMI (kg/d) ²	4.16 ^a	4.74 ^b	4.35 ^a	0.129	3.84 ^a	4.99 ^b	5.22 ^b	3.61 ^a	0.092	**	***	***
TDMI (kg/d) ³	8.85 ^a	9.43 ^b	9.04 ^a	0.129	8.70 ^a	9.51 ^b	8.72 ^a	9.49 ^b	0.092	**	***	***
Final LW (kg) ⁴	625	618	625	4.74	613 ^a	633 ^b	616 ^a	630 ^b	3.4	NS	***	**
LWG (kg/d) ⁵	1.04	0.98	1.04	0.036	0.93 ^a	1.11 ^b	0.96 ^a	1.08 ^b	0.026	NS	***	**
Carcass wt (kg)	338	333	341	2.66	330 ^a	346 ^b	334 ^a	341 ^b	1.9	NS	***	*
Car. gain (kg/d)	0.60	0.55	0.61	0.020	0.52 ^a	0.66 ^b	0.56 ^a	0.61 ^b	0.014	0.09	***	*
Kill out (%)	54.2	54.0	54.5	0.358	53.8 ^a	54.7 ^b	54.4	54.1	0.026	NS	*	NS
Conformation ⁶	3.07	3.07	2.93	0.635	2.98	3.07	2.94 ^a	3.11 ^b	0.045	NS	NS	*
Fat class ⁷	3.47	3.38	3.33	0.115	3.21 ^a	3.59 ^b	3.29	3.51	0.082	NS	**	0.07
Cooking loss	26.8 ^a	28.0 ^b	27.5 ^{ab}	0.333	27.61	27.3	27.31	27.56	0.272	*	NS	NS
WBSF (kg/cm ²)	2.59	2.59	2.63	0.058	2.61	2.60	2.53	2.68	0.048	NS	NS	*

¹There was a PM x GFL interaction ($P<0.05$) for SDMI and TDMI; SIL x GFL interaction ($P<0.05$) for final LW and LWG. There were no PM x SIL or PM x SIL x GFL interactions

²SDMI = Silage dry matter intake; ³TDMI = Total dry matter intake; ⁴LW = Live weight; ⁵LWG = Liveweight gain; ⁶= EUROP scale: 5, 4, 3, 2, 1 respectively; ⁷EU fat classification, where 5 = fat, 1 = lean, WBSF = Warner Bratzler shear force

Conclusions It is concluded that ensiling crimped grain did not alter meat quality or animal performance relative to conventionally processed and stored grain. However, ensiling urea-treated grain increased cooking loss and tended ($P=0.09$) to decrease carcass gain by 9%.

Reference

Keady, T.W.J., F.O. Lively, D.J. Kilpatrick & B.W. Moss (2005). Effect 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).