

**PROTEIN SUPPLEMENTATION OF SILAGE-BASED DIETS FOR FINISHING BEEF CATTLE***J.L. JACOBS and G.D. TUDOR*

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Animal performance on silage diets is improved by the inclusion of cereal grains due to an increased energy intake (Thomas *et al.* 1988), and it is well accepted that even when the protein content of silage-based diets is not limiting, the addition of protein supplements of low rumen degradability (eg. fishmeal) can further improve animal performance (Petit and Flipot 1992). The objective of this experiment was to compare silage-based diets offered with grain rations consisting of cereal grains and urea or lupins offered with or without a supplement of fishmeal.

The intakes and feed conversion ratios of 42 individually penned Angus-Friesian steers, with average initial liveweight of 300 kg (s.e.  $\pm 11.8$ ), fed silage-based diets with grain were measured over 120 days. The animals were randomly allocated to treatments after blocking on initial liveweight. Six diets were formulated with all animals receiving silage *ad libitum* and 1 of 6 grain rations; oats plus 1% urea (O, 3.6 kg), wheat plus 1% urea (W, 3.1 kg), or lupins (L, 3.0 kg), unsupplemented, or supplemented with 450 g of fishmeal (OF), (WF), (LF). At slaughter, carcass weight and P8 fat depth were recorded and 24 hours after slaughter a 5 rib set was removed from the left side of the carcass, dissected into muscle, bone and fat and the components in the carcass estimated from the equations of Johnson and Vidyadaran (1981).

The silage used in this trial had a dry matter (DM) content of a 252.8 g/kg and a digestible dry matter content and crude protein of 648 and 138 g/kg DM respectively.

Daily liveweight gain and final liveweight was significantly higher ( $P < 0.001$ ) when the steers were offered fishmeal (Table 1), although the addition of fishmeal did not affect silage intake. Feed conversion efficiency was significantly ( $P < 0.01$ ) improved by the addition of fishmeal. Fat depth at the P8 site increased significantly ( $P < 0.01$ ) with fishmeal supplementation. At the same carcass weight the carcass content of muscle and fat was similar for the unsupplemented diets but the addition of fishmeal significantly ( $P < 0.001$ ) decreased muscle content and increased fat content across all diets.

**Table 1. Performance and slaughter data of cattle fed oat (O), wheat (W) or lupin (L) supplements with or without fishmeal (F)**

	Grain diets						s.e.d
	O	W	L	OF	WF	LF	
Final liveweight (kg)	426	417	428	434	437	437	4.8
Liveweight gain (kg/day)	0.96	0.84	1.02	1.10	1.11	1.12	0.076
Grain intake (kg DM/day)	3.5	3.1	3	3.8	3.4	3.4	0.03
Silage intake (kg DM/day)	4.2	5.0	5.4	4.4	5.1	4.9	0.26
Feed conversion ratio (kg/kg)	8.1	9.8	8.3	7.6	7.8	7.5	0.56
Carcass weight (kg)	216	218	218	218	223	226	4.4
Fat P8 (mm)	8.7	8.2	7.9	8.7	11.7	9.7	0.99
Muscle (kg)	128.2	131.4	129.6	126.2	120.8	127.2	2.14
Fat (kg)	57.8	52.4	56.0	59.3	64.7	58.4	2.49

The results of this study demonstrate the potential of silage-based diets for finishing cattle "out of season" for the domestic market. This study also highlights the potential of supplementing silage-based diets with rumen undegradable protein, however due to the high cost of fishmeal other supplements need to be investigated. The reasons for the higher fat content in animals supplemented with fishmeal is unclear and further work is required to investigate this effect.

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