

FEED INTAKE, DIGESTIBILITY AND FERMENTATION PATTERNS OF BEEF CATTLE FED CHAFF AND WHOLE OR GROUND MAIZE GRAIN

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Processing maize improves starch digestibility in beef cattle fed high grain diets (Rowe *et al.* 1999). However, where maize grain is offered at low rates, e.g. 1% of body weight, associative effects between grain and forage could modify the response to grain processing. The aim of this experiment was to study the effect of grinding maize grain, when included as part of a forage-based diet, on feed intake, starch digestibility and ruminal fermentation pattern.

Six ruminally-cannulated heifers weighing 416 kg (s.d. ± 33.7) were used in a crossover design. Animals were individually penned indoors and randomly allotted to 1 of 2 diets: whole or ground maize grain (1 kg DM/100 kg liveweight) plus oaten chaff *ad libitum* (34.1% acid detergent fibre, 54.7% neutral detergent fibre, 17.3% crude protein). The experiment was divided into 2 periods of 21 days, with each animal receiving a different treatment in each period. Grain and chaff refusals were weighed daily and DM intake of each feed determined. For the last 14 days of each period, animals were dosed daily with 1.8 g of chromic oxide, directly through the cannula. Faecal samples were collected during the last 3 days of each period, every 6 hours, with a 2-hour shift in sampling time each day. On the last day, rumen fluid samples were taken every 3 hours for 24 hours and were analysed for pH, volatile fatty acids and ammonia concentrations. Data were analysed by using the Mixed Procedure of SAS where the effect of the period and the cow nested within sequence, and were considered random effects. Results are presented in Table 1.

Table 1. Intakes, digestibilities and rumen variables in heifers fed oats chaff *ad libitum* and supplemented with whole or ground maize.

Variable	Whole maize	Ground maize	P value	s.e.m.
Chaff DM intake (kg/day)	4.0	4.1	0.54	0.19
Grain DM intake (kg/day)	3.7	4.1	0.05	0.16
Total DM intake	7.7	8.2	0.10	0.26
Whole tract starch digestion (%)	83.9	84.4	0.94	5.80
DM digestibility (%)	68.0	66.3	0.55	2.62
Rumen fluid pH	6.45	6.41	0.78	0.11
Rumen fluid ammonia (mg/L)	118	117	0.95	29.9
Rumen fluid total volatile fatty acids (mM/L)	91	92	0.68	2.5

None of the response variables were affected by sequence of treatments. There was no effect of grinding maize grain on whole tract starch digestibility. It is suggested that damage of whole maize grains during ingestive mastication and rumination was enough to promote an efficient digestion of maize starch. This evidence may explain why animals fed whole maize in earlier studies (Simeone *et al.* 2002, 2003) grew at similar rates as those fed ground maize. The results indicate that it is not necessary to grind maize grain when it is fed as a supplement to cattle eating roughage. Being able to feed whole grain makes maize easier and cheaper to use.

ROWE, J.B., CHOCT, M. and PETHICK, D.W. (1999). *Aust. J. Agric. Res.* **50**, 721-736.

SIMEONE, A., BERETTA, V., ROWE, J.B., NOLAN, J. and ELIZALDE, J.C. (2002). *Anim. Prod. Aust.* **24**, 213-216.

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