Is mastication enough processing for maize grain?

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Grinding cereal grains for cattle feeding is generally considered to be important for efficient digestion and to minimize waste. Maize could be an exception as whole maize (WM) is commonly used in lot–fed cattle when the diet contains less than 20% roughage (NRC 1996) and can be used to supplement grazing animals (Beretta *et al*. 2001). Mastication of grain during eating will probably play a major role in reducing particle size, given the bigger size of maize with respect to other grains. However, grinding maize can modify the site of starch digestion increasing rumen degradability without necessarily increasing the grain whole tract apparent digestibility.

In this experiment we compared the effects of mastication and grinding of maize on rumen degradability. Four Hereford steers (LW 450 ± 30 kg) fitted with a rumen cannula and grazing an annual ryegrass pasture at a forage dry matter allowance of 5% body weight were randomly allocated to one of two treatments: supplementation with WM or ground maize (GM) at 1 kg/100 kg LW. Samples of masticated whole grain (MM) were manually collected from the distal end of the oesophagus during an eating cycle in one of the steers after rumen evacuation. Duplicate samples of MM and GM were placed in nylon bags in the rumen of steers on their respective treatments just before supplementing (at 0800 h) and removed after 3, 6, 9, 12, 18, 24, 36, 48 h. Bags with WM were removed only after 72 h of incubation. The *in situ* digestion measurement was repeated four times with 15 days between measurements. DM degradation data were adjusted to the Ørskov and McDonald (1979) model using a lag phase of 3 h for the MM. Model parameters were subjected to analysis of variance using a completely random design with repeated measurements. The model included treatment, measurement date, and the interaction between them. Steer was considered a random effect nested within treatment.

Maize DM contained 8.16% CP, 18.40% NDF, and 9.45% ADF. Degradability values obtained from the four times of *in situ* measurements did not differ significantly ($P>0.05$). Processing grain only affected soluble fraction disappearance (GM = 19.32 vs MM = 9.93 g/kg, $P<0.01$), and there was no difference in potentially degradable dry matter (GM = 81.51 vs MM = 71.78 g/kg, $P>0.05$) or rate of degradation (GM = 4.57 vs MM = 5.33%/hour, $P>0.05$). Total degradable dry matter did not differ ($P>0.5$) between treatments. Rumen DM degradability of whole maize at 72 h was 14%, while DM degradability for masticated grain at the same time was 81%. Masticated samples still had 22.6% of whole kernels, 13.8% broken kernels and the remaining 63.6% (< 0.25 kernel) was similar to ground maize. The results of our experiment highlight the magnitude of ingestive chewing and the efficient degradation of masticated material in the rumen. Considering that further mastication would occur during rumination and that part of the grain will be digested in the small intestine, the results from the current study indicate that whole maize can be efficiently digested by cattle.

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