An examination of the performance, nutrient digestibility, enteric methane emissions and rumen fermentation characteristics of beef cattle fed either barley or ground ear maize based diets

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Introduction Ground ear maize (GEM) is a novel feedstuff produced by ensiling the chopped maize ear and offers a higher quality feedstuff compared to conventional forage maize. A high grain yield and good grain maturity is required for the successful production of GEM. Preliminary work by O'Hanlon *et al.* (2008) showed that animals offered a GEM based diet had higher dry matter intakes compared with animals offered a barley based diet. The current study aimed to build on this data and evaluate the effect of GEM on performance, nutrient digestibility and enteric methane emissions of finishing beef heifers.

Materials and methods A commercial crop of maize (var. Benecia) was harvested for GEM (consisting of the cobs, husks and very limited stalk) on the 29th October 2008 using an Olimac stripper maize header. The GEM was then ensiled in round wrapped plastic bales by an Orkel baler. Thirty beef heifers (Limousin x Friesian) were randomly allocated to one of two treatments (1) GEM-based diet (2) barley grain-based diet, both of which were isonitrogenous (13.0 %CP), isofibrous (26.8% NDF) and isoenergetic (18 MJ GE/kg DM). The heifers were offered *ad libitum* access to feed and individual daily intake was recorded using an electronic feeding system (Insentec, Marknesse, The Netherlands). Both diets were offered as a TMR which included soybean meal to balance for protein and grass silage in the GEM TMR and chopped straw in the barley TMR to balance as a source of fibre. Daily feed intake was recorded for each animal for a period of 52 days. Daily methane (CH_4) emissions were determined using a calibrated tracer (SF_6) technique as described by Johnson *et al.* (1994) and modified by Hart *et al.* (unpublished). Methane emissions were recorded over a 24 h period for 5 consecutive days starting on day 23. Faecal grab samples were taken from the animals on days 23 and 24 in order to determine nutrient digestibility using the acid insoluble ash method. All data were analysed using the MIXED procedure of SAS (SAS Inst. Inc., Cary, NC) in accordance with the randomised block design employed.

Results Heifers offered the GEM based diet had higher DMI ($P<0.01$) and ADG ($P<0.05$) and a higher digestibility of dry matter, organic matter, nitrogen, starch and gross energy compared to those offered the barley based diet (Table 1). In addition heifers offered the GEM had lower overall daily and DMI corrected CH_4 emissions ($P<0.01$) compared to those offered the barley based diet.

Table 1 Effect of dietary treatment on animal performance, nutrient digestibility and CH_4 emissions.

	GEM	Barley	SEM	P-value
DMI (kg/day)	11.8	10.5	0.2892	0.006
ADG (kg/day)	1.4	1.2	0.0697	0.051
FCR (kg/kg)	7.7	8.1	0.4478	0.562
Digestibility Coefficient				
Dry matter	0.731	0.658	0.0096	0.0001
Organic matter	0.749	0.673	0.0094	0.0001
Ash	0.387	0.354	0.0123	0.0730
Nitrogen	0.661	0.561	0.0131	0.0001
Neutral detergent fibre	0.552	0.518	0.0162	0.1438
Acid detergent fibre	0.400	0.337	0.0242	0.0738
Starch	0.990	0.964	0.0034	0.0001
Gross energy	0.720	0.597	0.0103	0.0001
Methane emissions				
CH_4 g/day	199	238	12.3	0.039
CH_4 g/kg of total DMI	18.1	22.9	1.09	0.005

Conclusion Heifers offered a GEM based diet had higher DMI, gained 200g more liveweight per day and emitted 21% less DMI corrected methane compared to those offered the barley diet.

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