METHANE REDUCTION IN BEEF CATTLE USING A NOVEL ANTIMETHANOGEN

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An antimethanogen (AM) containing bromochloromethane (BCM) in a α-cyclodextrin matrix has been developed which has the potential to inhibit methane production when fed to ruminants (May *et al.* 1995). Once complexed, the volatile nature of BCM is reduced and release in the rumen is more predictable. Knowledge of the dose response, effect on animal productivity and residue status are prerequisites for registration of the complex. The aims of this study were to determine the dose response of the AM on methane production, and to establish effects on feed intake, liveweight (LW) gain and residue concentrations in edible tissue.

In the first of 2 experiments, 18 Brahman cross steers were adapted to a feedlot diet over 21 d, randomly allocated to 1 of 4 treatments, and offered the diet *ad lib* throughout the experimental period. Animals in each group were given an AM dose twice daily (0, 0.15, 0.30, or 0.60 g/100kg LW) presented in 100 g cottonseed meal. Liveweight was measured weekly and feed intake daily. Following 28 d of AM treatment, methane production from each animal was measured in a confinement type respiration chamber for the first 12 h after feeding. The second experiment measured LW gain and feed intake of 24 Brahman cross steers over 85 d. Steers were allocated to 1 of 2 groups (0 or 0.30 g AM/100 kg LW twice daily). Residues of BCM were determined using purge and trap gas chromatography with MSD detection for meat and edible offal collected at slaughter either 1 or 10 days after cessation of AM treatment.

Table 1. Animal feed intake and methane production in steers given an oral antimethanogen (AM) twice daily for 28days.

	AM dose (g/100kg LW)			
	0^1	0.15^1	0.30^2	0.60^2
Animal productivity				
Initial live weight (kg)	296±14	297±11	272±18	259±18
Dry matter intake (kg/d)	6.2±0.3 ^{b}	7.4±0.5^a	5.6±0.3 ^{b}	5.5±0.4 ^{b}
Methane production)				
mL/min^2	56.9±14.1 ^{a}	28.2±10.0^{ab}	5.2±2.6^b	6.8±5.4^b
L/kg Dry matter intake	15.9±6.1 ^{a}	6.9±3.0 ^{ab}	2.6±1.2 ^{b}	1.4±0.8 ^{b}
GE loss as CH_4 (MJ/d)$^{\# 2}$	1.6±0.5 ^{a}	0.8±0.3^{ab}	0.1±0.07^b	0.2±0.15^b
CH_4 energy (%GEI)$^{\# 2}$	3.9±1.5^a	1.0±0.5^{ab}	0.6±0.3^b	0.3±0.2^b

^{1}n=4, ^{2} n=5. Methane production measured for only 4 animals given 0.30g/100kg LW. Means in the same row that do not share common superscripts are significantly different ($P<0.05$). Methane data adjusted using covariate analysis by chamber dry matter intake,^{2}direct measure in respiration chambers over 12h, $^\#$GE gross energy, GEI GE intake.

Table 2. Animal productivity in steers given an oral antimethanogen (AM) twice daily for 85 days.

	AM dose (g/100kg LW)	
	0^1	0.30^2
Initial live weight (kg)	318±7	329±5
Dry matter intake (kg/d)	7.5±0.3	8.0±0.3
Average daily gain (kg/d)	1.4±0.1	1.5±0.1
Feed: gain ratio^3	5.7±0.3	5.4±0.1

^{1}n=10, ^{2} n=11,^{3}kg(dry matter intake)/kg(average daily gain)

Dose rates of 0.30 and 0.60g/100kg LW significantly reduced methane production (Table 1). The AM treatment did not affect DMI over 85 d (Table 2), a result contrary to that reported by McCrabb *et al.* (1997). No residues of BCM in any of the tissue samples were found to exceed the temporary maximum residue limit of 0.02 mg/kg (NRA 2002). Results indicate that the technology has potential for reducing methane emissions from beef feedlots and dairy cattle.

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