

The effect of essential oils compounds on methane production measured with gas production technique

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Introduction

Eugenol (E) and Cinnemaldehyde (C) have been shown to decrease the acetate to propionate ratio and the ammonia N concentration in the rumen. Garlic and some of its fractions have demonstrated similar results, and a decrease of the methane/VFA ratio. The aim of this trial was to study the effect of E plus C *vs* PPT (propyl propyl thiosulfonate, a standardized active component of garlic) at different doses on methane production and rumen microbial fermentation.

Material and methods

In vitro gas production technique

TREATMENTS	DOSES (mg/l)
E (62%) and C (38%) PPT	20, 40, 80, 120, 160
Negative Control (NC) No additive	0
Positive Control (MO) Monensin	500

Treatments were tested in duplicate and in two periods. Glass tubes + 30ml of a 1:4 ruminal fluid-to-buffer solution + 0.25 g of DM of a 60:40 forage: concentrate diet. Incubated for 48h at 39C. Gas production taken at 0.75, 1.25, 2, 4, 8, 12, 24, and 48 h. Methane, ammonia-N and VFA were analyzed 24 h after the beginning of the incubation. Gas production and degradability rate were fitted to an exponential model (Orskov and McDonald, 1979). Randomized block design. Statistical analysis using PROC MIXED of SAS.

Results

	NC	E+C20	E+C40	E+C80	E+C120	E+C160	MO	SE
Methane (μl/ml)	14,35	13,25	15,74	16,30	13,90	16,31	1,87*	1,494
Total VFA (mol/100mol)	86,37	85,45	87,00	83,56	81,38	66,86*	57,94*	5,207
Methane/VFA	0,17	0,16	0,18	0,20	0,17	0,24*	0,02*	0,019
Acetic acid (mol/100mol)	77,44	77,45	77,17	77,51	77,89	77,29	69,54*	0,476
Propionic acid (mol/100mol)	13,00	13,07	13,12	13,09	12,78	12,65	18,40*	0,510
Butyric acid (mol/100mol)	6,61	6,71	6,72	6,64	6,70	7,23*	8,59*	0,105

* P < 0,05
† P < 0,10

	NC	PPT20	PPT40	PPT80	PPT120	PPT160	MO	SE
Methane (μl/ml)	14,35	16,16	15,55	14,21	11,41	6,12*	1,87*	1,768
Total VFA (mol/100mol)	86,37	80,90	83,63	83,44	77,94	69,70†	57,94*	5,134
Methane/VFA	0,17	0,20	0,19	0,17	0,15	0,08†	0,028*	0,025
Acetic acid (mol/100mol)	77,44	77,33	77,10	77,18	76,34†	74,38*	69,54*	0,332
Propionic acid (mol/100mol)	13,00	13,07	13,14	13,15	13,63	14,60*	18,40*	0,448
Butyric acid (mol/100mol)	6,61	6,85	6,85	6,89	7,06†	7,68*	8,59*	0,089

Conclusion

E+C (160mg/l) reduced total VFA and increased methane-VFA ratio.

PPT at high dose (160mg/l) reduced methane production, and increased propionic acid production, but decreased total VFA and methane-VFA ratio.