

Can methane emissions of ruminant animals be reduced by altering composition of feed oats?

A. A. Cowan, D. R. Davies, D. K. Leemans, J. Valentine and A. Marshall

1 The Message

Agriculture contributes to greenhouse gas production. In particular ruminants contribute to methane emissions. Using combinations of oat varieties we prepared examples of potential feed oats and studied the effect of these oats on gas production. Particular combinations of oat were found to reduce methane emissions by ruminants.

2 Introduction

Oats are a low input crop and Lifecycle analysis has shown them to be more environmentally friendly than other cereals. At IGER we have a diverse range of oat varieties. These include high oil naked oats, conventional husked oats and low lignin husked oats. By adding different combinations of these we developed potential "ideal" feed oats, and used an in vitro gas production system to determine if there was any effect on gas produced.

3 Methods

Several oat varieties either husked or naked were selected. The husked varieties were dehulled and groats and husk kept separate. Potential feed oats were designed using different groat and husk combinations. These were then tested using the in vitro gas production system.



4 Results

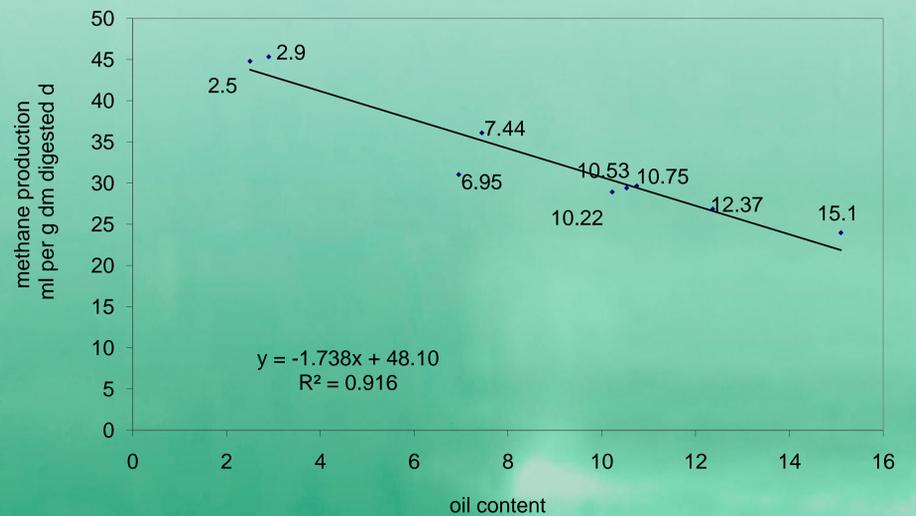


Figure 1. Effect of oil content on methane production.

Table 1. Results of gas production corrected to gas produced per g dry matter digested.

Treatment	% dry matter digested	Gas volume (ml) produced per g dry matter digested		
		Oil	Total gas	CH ₄
normal groat Gerald (ng)	95.21	6.95	295.01	31.04
high oil groat Chris (hg)	93.41	10.75	295.95	29.66
normal husk Gerald (nh)	23.60		379.77	35.90
low lignin husk Assiniboia (lh)	73.16		392.29	49.12
mixture 75%/25% normal groat /normal husk (ng/nh) "Gerald"	72.17		340.56	36.22
mixture 75%/25% normal groat /low lignin husk (ng/lh)	86.71		331.01	39.03
mixture 75%/25% high oil groat /normal husk (hg/nh)	74.38		281.77	30.23
mixture 75%/25% high oil groat /low lignin husk (hg/lh)	83.45		328.01	33.34
consort (wheat)	93.55	2.90	363.12	45.34
high oil groat N327-6	97.91	15.01	277.83	23.97
high oil groat Racoon	96.30	10.22	300.10	28.92

5 Conclusions

- Increased oil content reduced methane production.
- The combination of high oil and low lignin husk reduced methane emissions more than an ordinary husked oat.
- In addition to reducing emissions when given as a feed, oats being a low input crop contribute less greenhouse gases in their production compared with wheat.
- Breeding effort will be concentrated to develop a low lignin husked high oil line for further testing as an animal feed stuff.