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The XXI International Grassland Congress / VIII International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

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Presenter Information

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The influence of sward quality on enteric methane production by zero grazed beef cattle

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Key words : methane , pasture quality , cattle

Introduction Beef production within Ireland is based predominantly grass based . Enteric methane production from cattle accounts for a loss of approximately 7% of the gross energy of consumed feed . It is believed that increasing the diet quality in terms of sward digestibility would increase feed intake , increase rumen outflow rate and subsequently reduce methane production . The aim of this experiment was to produce 2 swards differing in dry matter digestibility (DMD) and evaluate the methane production from zero grazed cattle .

Materials and methods A 4 ha field , predominately perennial ryegrass (*Lolium perenne*) , was utilized for this experiment . The entire sward was grazed by sheep over winter until the 3rd April 2007 . The sward was divided into 2 ha sections and all animals were removed for 21 d . One section remained ungrazed and unfertilised for the duration of the experiment and was considered to be of low DMD . The other section was grazed freely by 20 heifers for 21 d and was subsequently strip grazed with only 10 heifers . This section received 30 , 3 and 12 kg/ha of N , P and K respectively on 24th May 2007 and was considered high DMD . Twelve heifers were used in 2 periods to measure daily intakes , methane production and apparent whole-tract digestibility . Animals were zero grazed for 21 d with the first 14 d being used for adaptation and the last 7 d for sampling . Individual intakes were recorded daily , methane was estimated using the SF₆ technique (Johnson et al . , 1994) . Digestibility was determined using acid insoluble ash as a natural marker . *In vitro* DMD was determined on grass samples using the method of Tilley and Terry (1963) and ME was estimated by the method of Givens et al . (1990) . Data was analysed using SAS (SAS , 2004) .

Results and discussion The grass swards offered in this experiment were similar in DM and OM but the low digestibility sward had a higher NDF and ADF content . The CP content of the high DMD sward was higher than that of the low DMD sward . The *in vitro* DMD was determined to be 676 and 771 g/kg DM for the low and high digestibility swards respectively . Estimated ME was 12 .1 and 10 .5 MJ/kg DM for the high and low DMD swards respectively . Cattle offered the high DMD sward had a higher (P<0 .01) intake and total methane production compared to the low DMD sward (Table 1) . However , there was no difference when compared on a DM basis . The apparent whole-tract digestibility for CP and NDF was higher (P<0 .001) in the high DMD sward (Table 1) .

Table 1 Effect of grass digestibility on intake , methane production and digestibility .

	Grass digestibility		Significance	
	High	Low	S .E .M .	P
DM intake kg/d	8 .22	5 .74	0 .273	<0 .001
Methane g/d	193	138	9 .7	0 .003
Methane g/kg DMI	23 .9	24 .0	1 .34	0 .955
Apparent whole-tract digestibility				
CP g/kg CP	724	528	20 .7	<0 .001
NDF g/kg NDF	792	651	16 .4	<0 .001

These results suggest that cattle consuming a higher DMD sward would have an increased energy intake and would therefore grow at a faster rate . An increased growth rate may reduce lifetime methane emissions from grazing animals and be beneficial in terms of production costs and reduced environmental emissions .

Conclusion There was no difference in methane emissions from cattle fed swards differing in DMD when compared on a DM basis

References

- Givens , D .I . , Everington , J .M . , Adamson , A .H . 1990 . The nutritive value of Spring-grown herbage produced on farms throughout England and Wales over 4 years . III . The prediction of energy values from various laboratory measurements . *Anim . Feed Sci . Technol .* 36 . 215-218 .
- Johnson , K . , Huyler , M . , Westburg , H . , Lamb , B . , Zimmerman . P . 1994 . Measurement of methane emissions from ruminant livestock . Using a SF₆ tracer technique . *Environ . Sci . Technol .* 28 . 359-362 .
- SAS . 2004 . SAS/FSP 9 .1 procedures guide . SAS Publishing , NC , USA .
- Tilley , J .M .A . , Terry , R .A . 1963 . A two stage technique for the *in vitro* digestion of forage crops . *J . Brit . Grassland Soc .* 18 . 104-111 .