



NITRATE NITROGEN AS A FERMENTABLE NITROGEN SUPPLEMENT TO INHIBIT METHANE PRODUCTION IN CATTLE

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INTRODUCTION

- ✓ Nitrate could potentially replace urea to provide a source of rumen ammonia (*Hao, et al 2008*).

- ✓ Nitrate is toxic when:
 - Abnormally high and sudden intake of nitrate in a meal.
 - Lack of adaptation of rumen organism to nitrate
 - Diets excessively high in rumen degradable protein (*Leng, 2008*).



INTRODUCTION

- Is it hypothesised that:
 - Nitrate will be used efficiently and safely as major source of rumen ammonia in diets.
 - The diets used widely to support rumen production in non-industrialised countries are based mainly on agro industrial by products (Preston and Leng 1987).



OBJECTIVES

1. There is considerable potential to use nitrate to replace urea as major fermentable nitrogen source in cattle.
2. Nitrate as fermentable nitrogen supplement to inhibit methane production in cattle.



MATERIAL AND METHOD

Animal: Three rumen fistulated

Cattle were allocated with

3 x 3 latin square design.

- **Treatment 1:** S (sodium nitrate)

- **Treatment 2:** AM (Ammonium nitrate)

- **Treatment 3:** U (Urea)

- **Each period:** 4 weeks; 2 weeks
for adaptation and 2 week for experiment





MATERIAL AND METHOD

Table 1. Percent of ingredient of diets for experiment (DM%)

Feeds	% of Basal diet of SN	% of Basal diet of Urea	% of Basal diet of AM
NaOH-Rice straw	48.4	52.8	52
Molasses	20	20	20
Cotton seed meal	20	20	20
Grass	5	5	5
Sodium nitrate	6.6	0	0
Urea		2.2	0
Ammonium nitrate			3



MATERIAL AND METHOD

Cattle were fed mixed diets:

- NaOH-treated rice straw
- Para grass
- Cotton seed meal
- Molasses
- And one of the three sources of N
- Cattle were offered feed two times/ day, at 8: AM and 15: PM.
- Fresh water always was available.





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MATERIAL AND METHOD

Picture 1



1. Machine to measure volume of rumen gas

Picture 2



2. Machine to measure percent of rumen gas

Picture 3



3. Rumen gas containing Special bags

Picture 4



4. Rumen gas collecting System



MATERIAL AND METHOD

Measurement:

- Feed intake was collected every day
- Growth rate: cattle were weighed after every two weeks of experiment.
- Rumen gas samples were collected for measuring methane and carbon dioxide.



RESULTS AND DISCUSSION

Table 2: Percent of methane and CO₂ of in rumen gas (%)

	Sodium nitrate	Ammonium nitrate	Urea	SEM	Prob
Methane, %					
8.00am	9.3	10.5	13.2	0.82	0.14
11.00am	3.13 ^a	4.13 ^a	7.37 ^b	0.27	0.014
CO₂, %					
8.00am	25.3 ^a	27.9 ^a	37.8 ^b	0.81	0.015
11.00am	11.6	17.6	25.6	1.93	0.071



RESULTS AND DISCUSSION

Table 3. Mean values for change in live weight of cattle fed NaOH-treated rice straw and fermentable rumen N from sodium nitrate, ammonium, nitrate or urea

	Sodium nitrate	Ammonium nitrate	Urea	SEM	Prob
Live weight, kg					
Initial	190	195	194	2.33	0.39
Final	196	201	200	2.1	0.39
Daily gain	0.476	0.453	0.429	0.024	0.5
DM intake, kg/d	5.57	5.52	5.43	0.11	0.7



CONCLUSION AND SUGGESTION

- ✓ Nitrate as fermentable nitrogen supplement to inhibit methane production in cattle.
- ✓ Need to study promotion ammonia formation in rumen (introduce sulphur in diet).



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THANK YOU VERY MUCH FOR YOUR ATTENTION

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