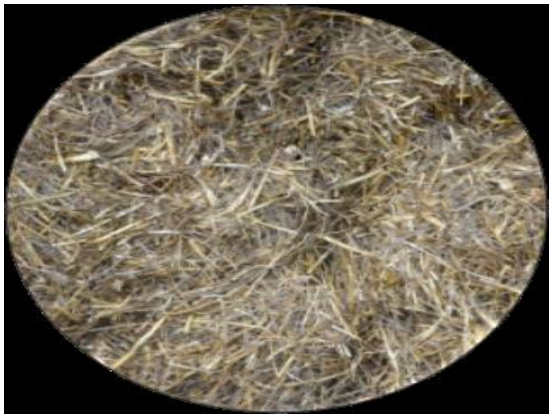
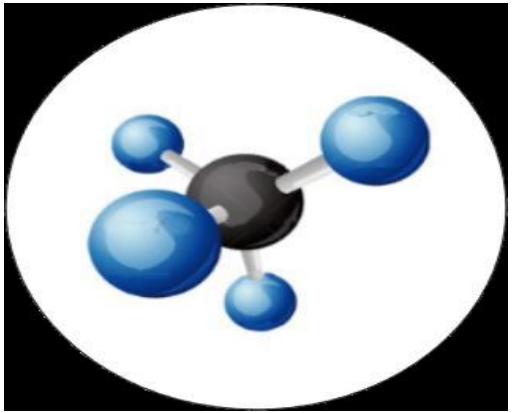
Effect of grass silage maturity and level of intake, on in vitro gas and methane production





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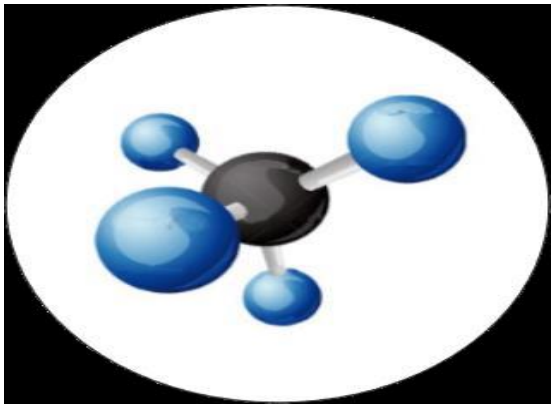
Why we care about methane(CH_4)?



CH_4 is an important green house gas

CO_2
N_2O } global warming

$CH_4 \Longrightarrow$ Energy loss

Do we have some alternatives on CH_4 reduction?

- Feeding strategies explored.
- Quality of forage is a key factor for ruminant performance.
- CH_4 production is influenced by quality of grass and level of intake.

Aim:

- To evaluate the effect of quality of ensiled grass harvested at different maturities and levels of feed intake of donor cows on *in vitro* gas production and CH_4 synthesis in dairy cows using rumen fluid from the *in vivo* trial.

How we did the experiment

- Substrate

  4 grass silages
- Rumen fluid (donor cows)

Grass silage A	Grass silage B	Grass silage C	Grass silage D

How we did the experiment

Gas production measured with:

- Automated system during 48h (Cone et al., 1996)
- CH_4 measured at distinct time points
- Analysis
- Volatile fatty acid (VFA).

Incubations combinations for the in vitro experiment

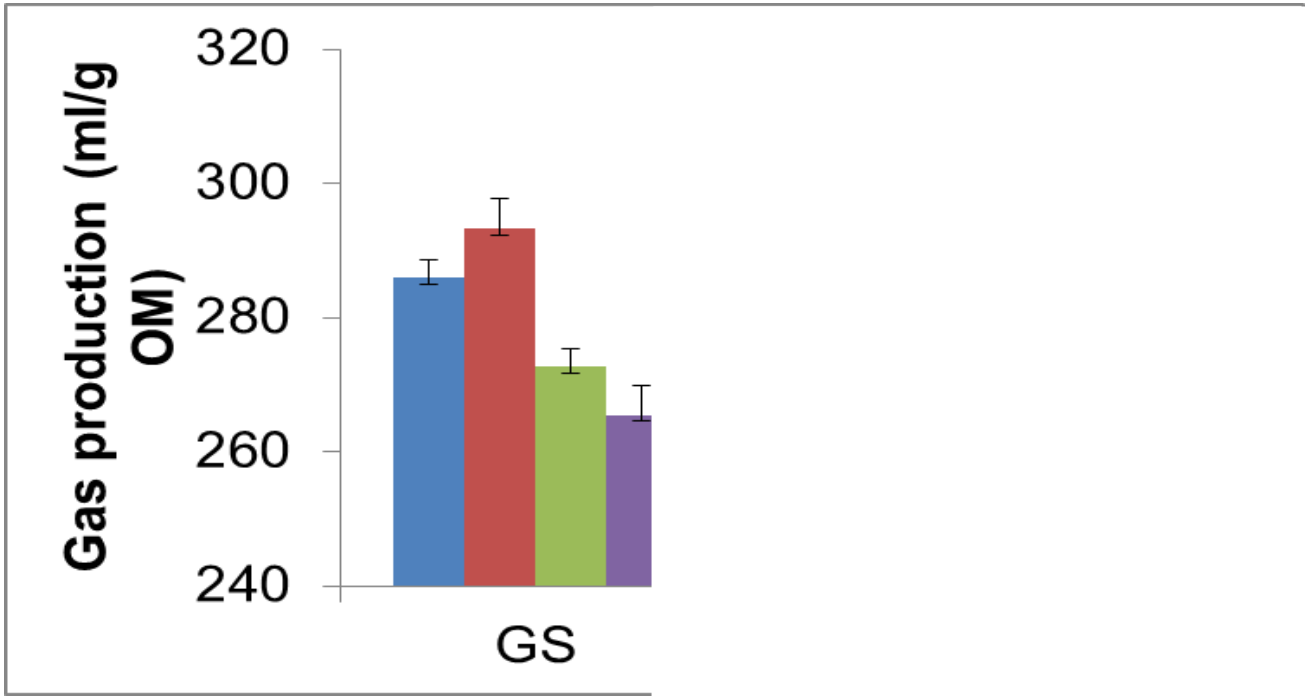
Substrate	Intake	Rumen fluid			
		A	B	C	D
GS A	High,Low	3	3	3	3
TMRA	High,Low	3	-	-	-
GS B	High,Low	3	3	3	3
TMRB	High,Low	-	3	-	-
GS C	High,Low	3	3	3	3
TMRC	High,Low	-	-	3	
GS D	High,Low	3	3	3	3
TMRD	High, Low	-	-	-	3

7 GS, grass silage; TMR, total mixed ration

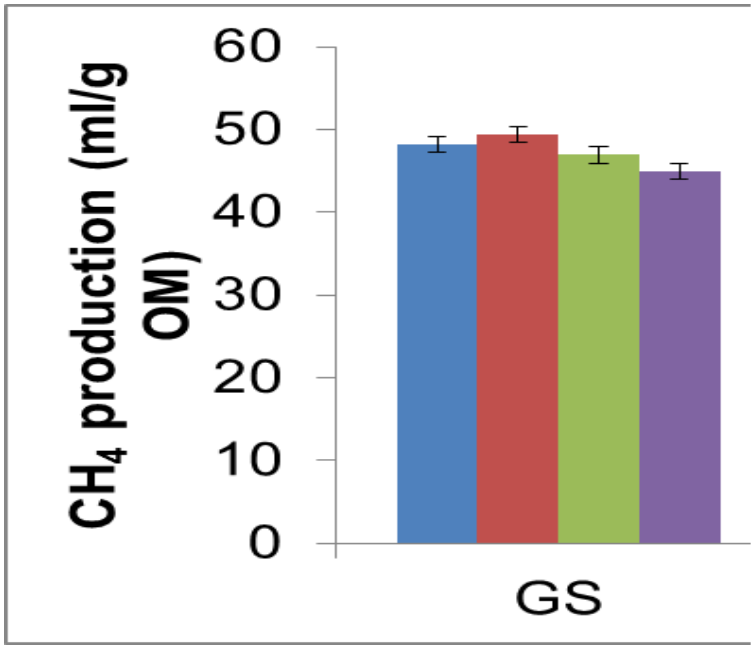
Table 1. Chemical composition (g/kg DM).

Item	Grass silage			
	A	B	C	D
DM g/kg	456	510	407	431
OM	894	898	909	921
CP	286	209	145	124
NDF	365	469	518	546

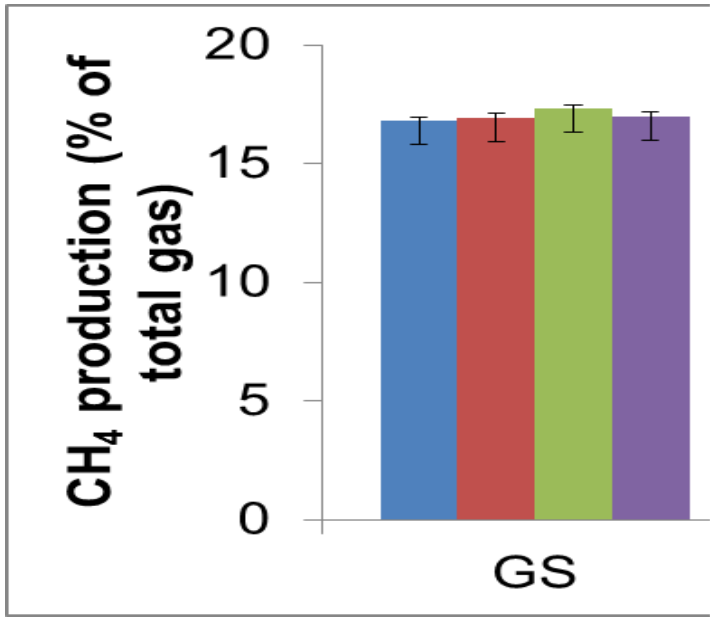
Gas production (GP) using grass silage (GS) or TMR.



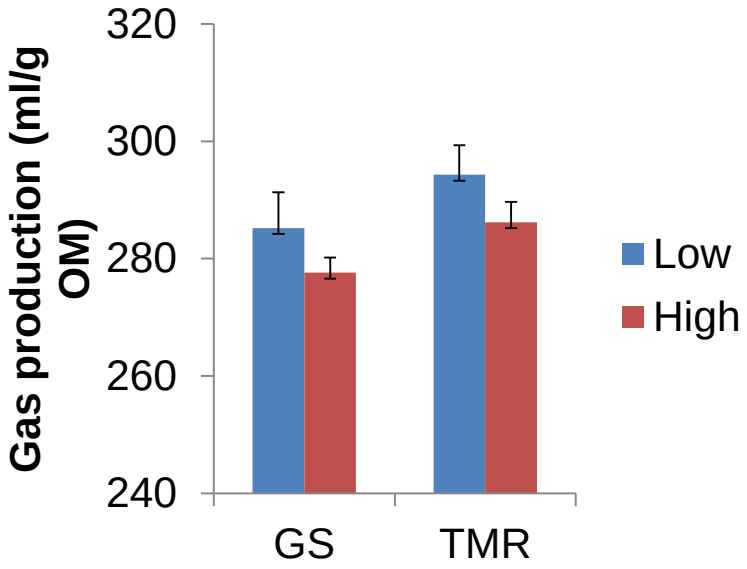
CH_4 production(ml/g OM) using grass silage(GS) or TMR

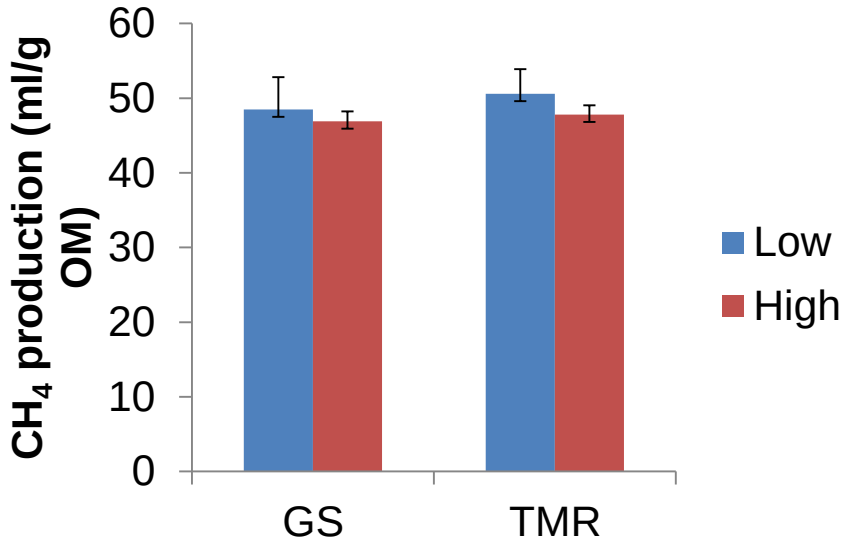


CH_4 production (%) using grass silage (GS) or TMR.

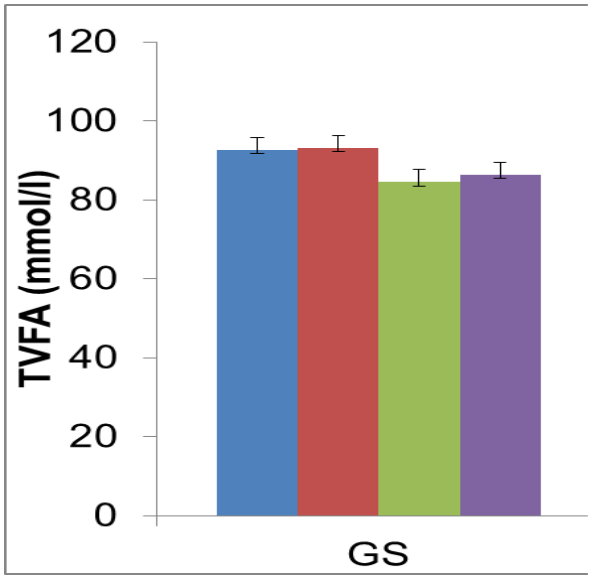


Effect of feed intake level on gas and CH_4 production

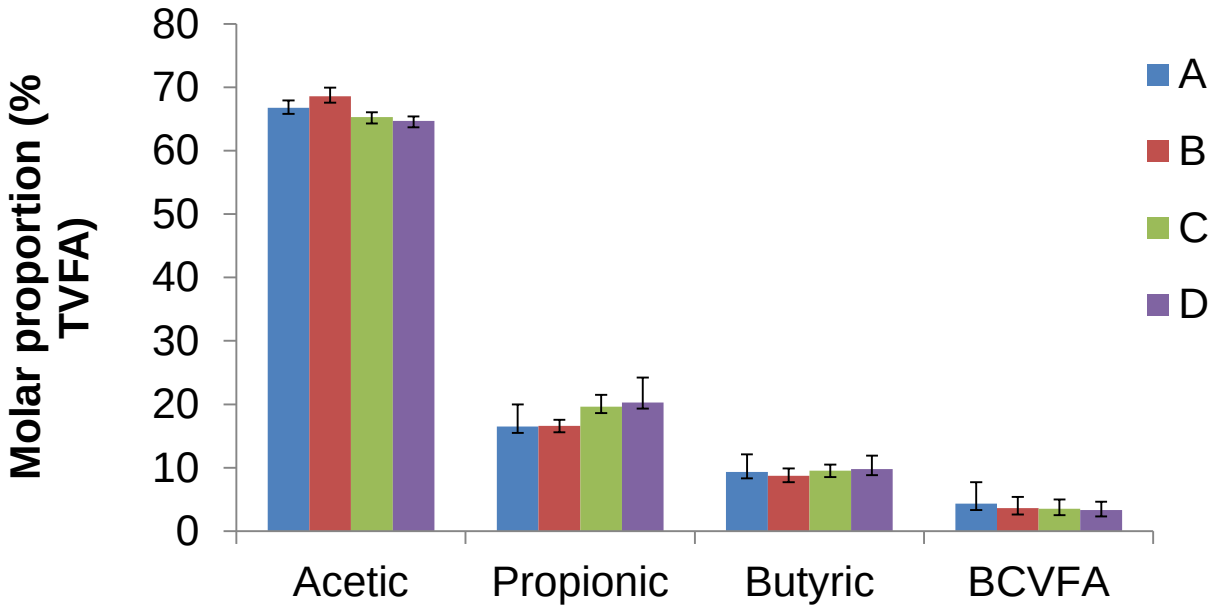




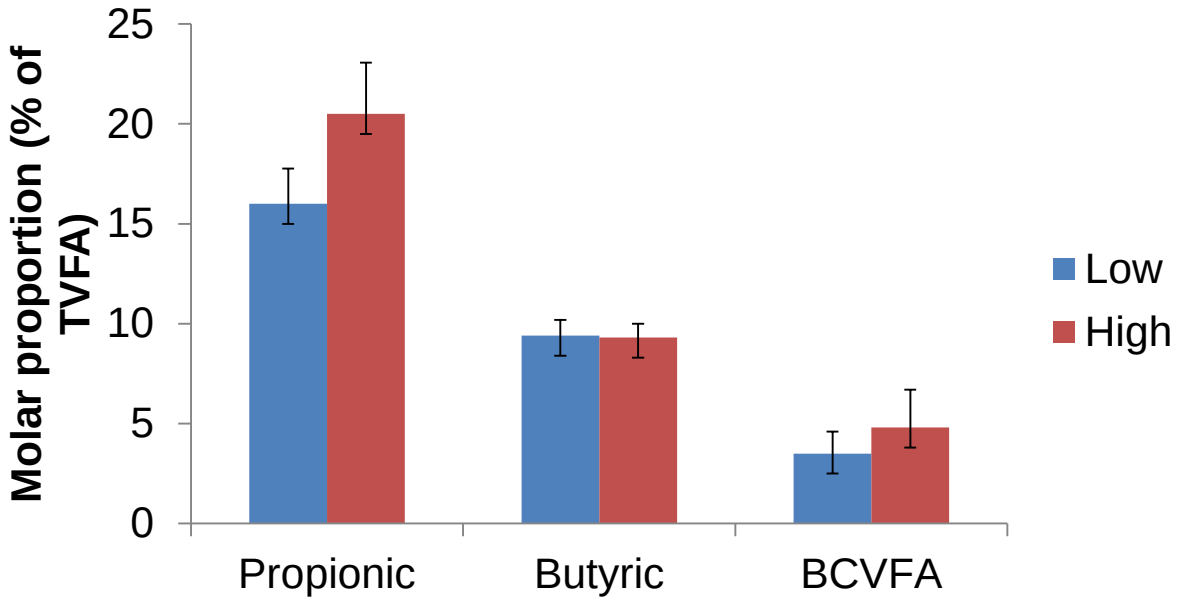
Total volatile fatty acid (TVFA) using grass silage (GS) or TMR



Effect of maturity on molar proportion of VFA



Effect of level of intake on molar proportion of VFA



Discussion

- ↓ GP was expected (Cone et al.,1999).

- (Purcell et al., 2011) ↓ CP, increase of NDF and ADF → higher (acetate and butyrate).
- Holtshausen et al. (2012). Reported increased propionate in mature grass similar result found in this study.
- (Bosh et al., 1992; Rinne at al., 2002) reported no change.

Conclusions

- *In vitro* gas production (ml/g OMI) decrease with increasing maturity.
- Gas and CH_4 production were higher in low feed intake group.
- TVFA was not affected by maturity and molar proportion of propionic acid and BCVFA were affected by level of feed intake.
- Molar proportion of propionic, butyric acid and BCVFA were affected by maturity.

THANK YOU FOR YOUR ATTENTION!!

ANY QUESTION?