

# In vitro fermentation and methane production of maize silages harvested at different maturities in rumen fluid, adapted to the maize silages or not



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## Background

Methane (CH<sub>4</sub>) emission from the rumen is influenced by adaptation of the rumen microbial population, caused by the type of feed. For instance feeding animals more fermentable starch results in more amylolytic bacteria and less methanogenic and fibrolytic bacteria (Martin et al., 2010). It is known that adaptation of the microbial populations to a specific feed leads to a faster fermentation of that feed (Cone and Van Gelder, 2006).

## Objective

- To evaluate the effect of adaptation of the rumen microflora to maize silages, differing in maturity. Fermentation of the silages in adapted and non-adapted rumen fluid and CH<sub>4</sub> synthesis was determined using the gas production technique.

## Materials and Methods

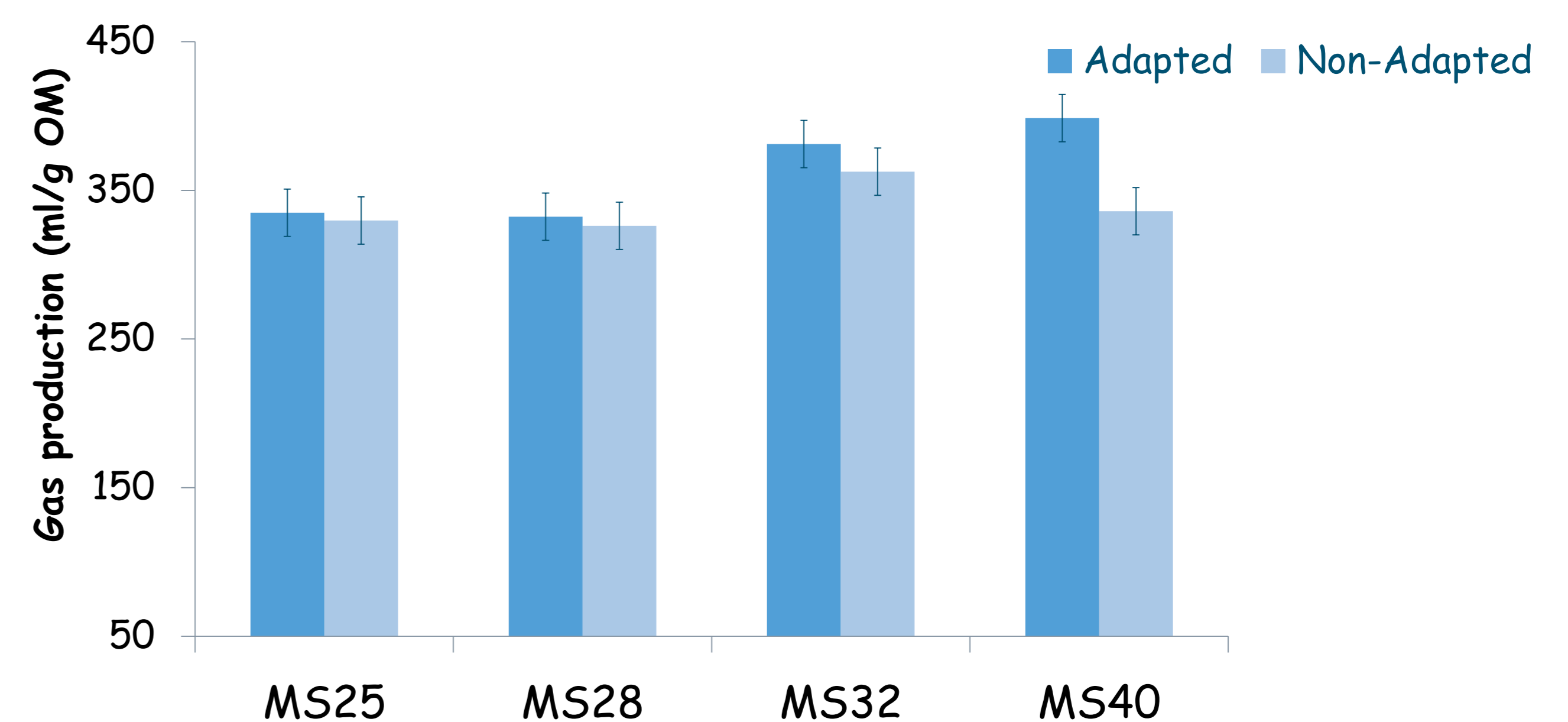
- The total mixed ration (TMR) consisted of (% DM) 75% maize silage (MS), 20% concentrate and 5% wheat straw.
- Maize was harvested in 2013 at September 20, (25% DM; MS25), September 28 (28% DM, MS28), October 9 (32% DM, MS32) and October 31 (40% DM, MS40).
- Eight rumen cannulated cows were fed TMRs with one of these 4 maize silages, and used as rumen fluid donors.
- Each substrate of MS was incubated with rumen fluid from cows adapted to that maize silage and with rumen fluid from cows that were not adapted.

**Table 1.** Chemical composition (g/kg of DM) of the maize silages differing in maturity.

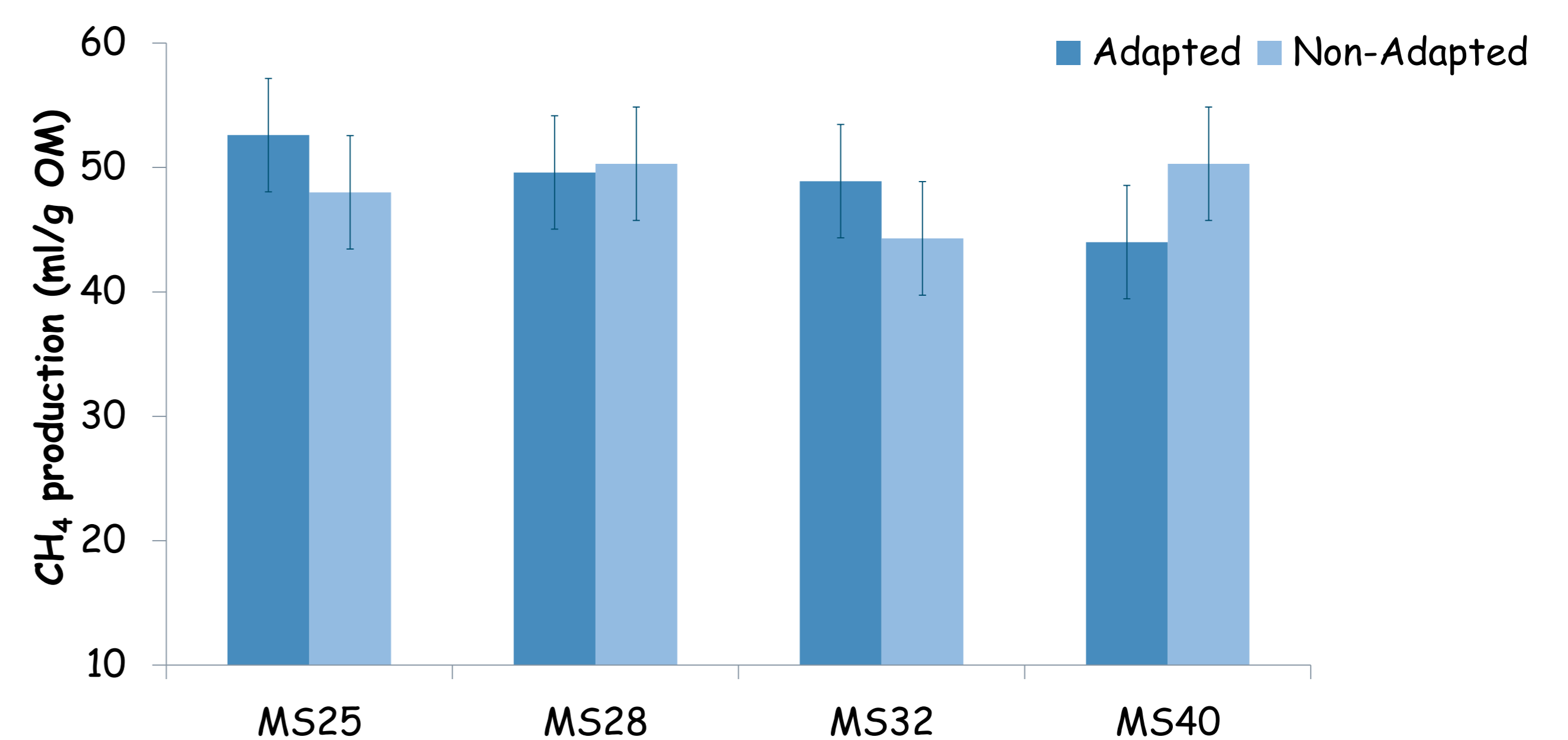
Item	Maize silage			
	MS25	MS28	MS32	MS40
Growing days	128	136	147	169
DM content (g/kg)	283	292	318	396
Chemical composition (g/kg DM)				
Ash	39	37	37	35
CP	83	83	80	79
NDF	407	394	359	349
ADF	242	233	207	195
Starch	275	305	356	385

- Gas production was measured using a fully automated system (Cone et al., 1996).
- In vitro CH<sub>4</sub> production was measured using the automated gas production technique as described by Pellikaan et al. (2011).

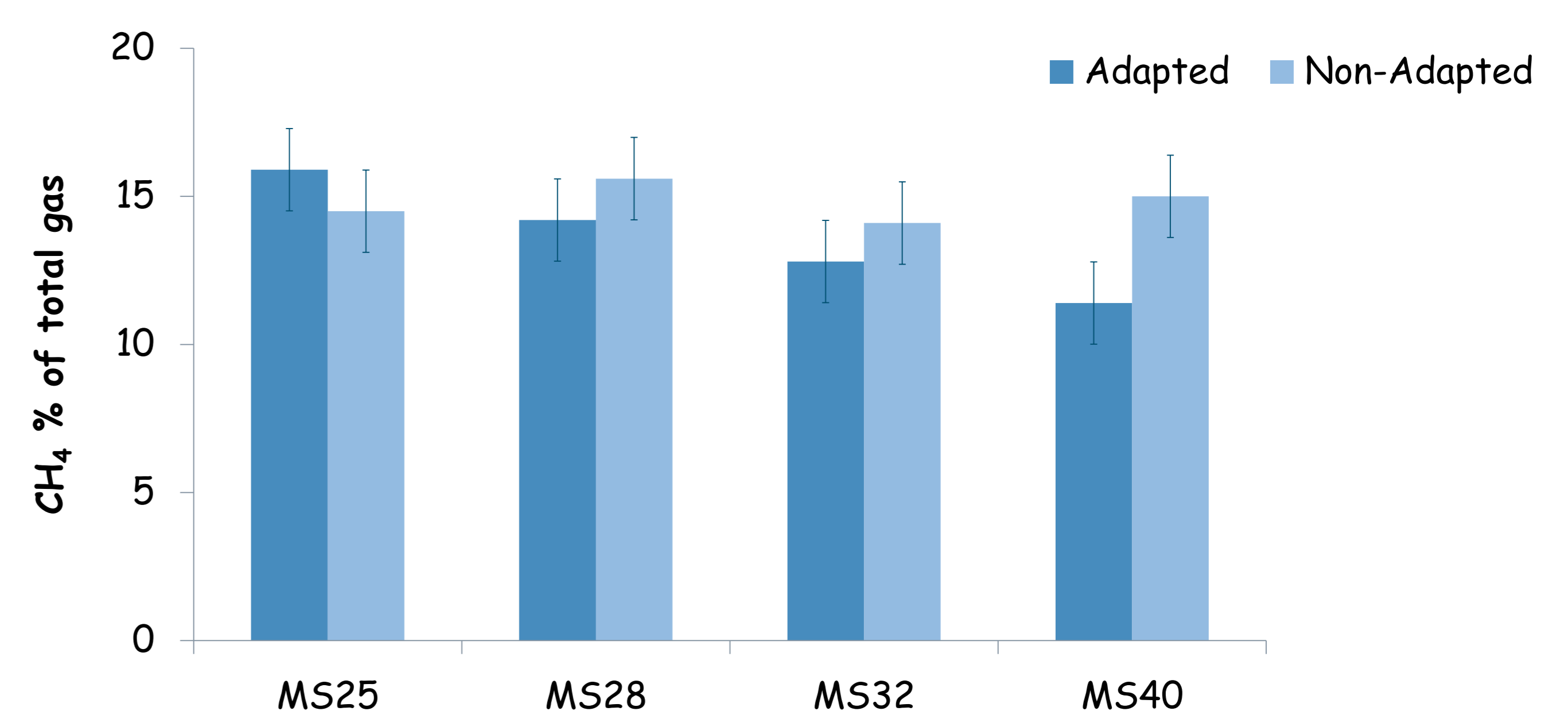
## Results



**Figure 1.** Gas production of maize silages differing in maturity after 48h of incubation in either adapted or non-adapted rumen fluid.



**Figure 2.** Methane production of maize silages differing in maturity after 48h of incubation in either adapted or non-adapted rumen fluid.



**Figure 3.** Methane production expressed as % of the total gas of maize silages differing in maturity after 48h of incubation in either adapted or non-adapted rumen fluid.

## Conclusions

- Advancing maturity of maize caused a higher starch content and increased the gas production using rumen fluid from adapted cows, but not when using rumen fluid from non-adapted cows.
- CH<sub>4</sub> production (ml/g OM) was not affected by maturity when using rumen fluid from adapted and non-adapted cows.
- CH<sub>4</sub> production decreased numerically when using adapted rumen fluid.