

In vitro gas and methane production from grass silages differing in maturity and N-fertilisation levels using adapted and mixed rumen fluid

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Objective

To determine the *in vitro* gas and methane (CH₄) production caused by fermentation of grass silages differing in maturity and nitrogen fertilisation using rumen fluid from cows adapted to each silage and rumen fluid from the 6 lactating cows mixed.

Conclusions

- Maturity negatively influences the degradability of grass silage in rumen fluid.
- Maturity and N-fertilisation of grass silage do not have a clear influence on the methane production upon fermentation in rumen fluid.

Materials & Methods

- Six silages of grass differing in maturity and N-fertilisation were fed to cows as part of a complete ration.

Table 1. Chemical composition (g/kg DM) of ryegrass silages treated with low nitrogen fertilisation (LF, 65kg/ha) and high nitrogen fertilisation (HF, 150kg/ha), respectively and harvested at early maturity (EM), mid maturity (MM) and late maturity (LM).

Item	LF			HF		
	EM	MM	LM	EM	MM	LM
Dry matter yield, Kg/ha	2023	3214	3535	2055	3609	5796
Organic matter	903	924	934	895	902	914
Crude protein	149	106	78	197	173	120
Sugars	98	190	179	54	79	69
Neutral detergent fiber	476	501	561	459	507	603
Acid detergent fiber	282	288	315	280	298	353
Acid detergent lignin	20	24	26	21	22	32

grass silage.

- Each substrate was incubated with that adapted rumen fluid and with that mixed from 6 cows
- In vitro incubations were done in duplicate

Results

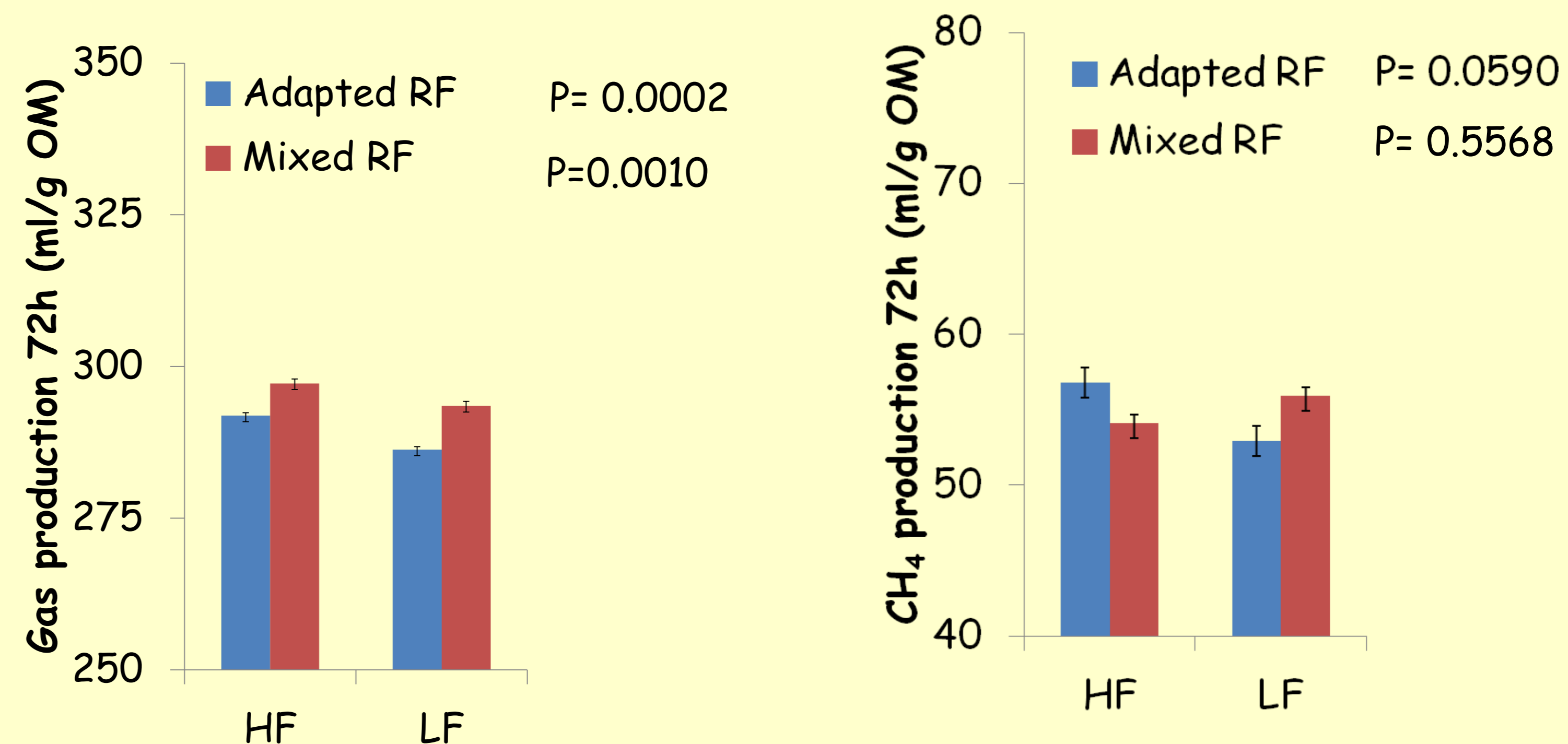


Figure 2. Effect of fertilisation level of grass silages on gas and CH₄ production after 72h of incubation either adapted or mixed rumen fluid.

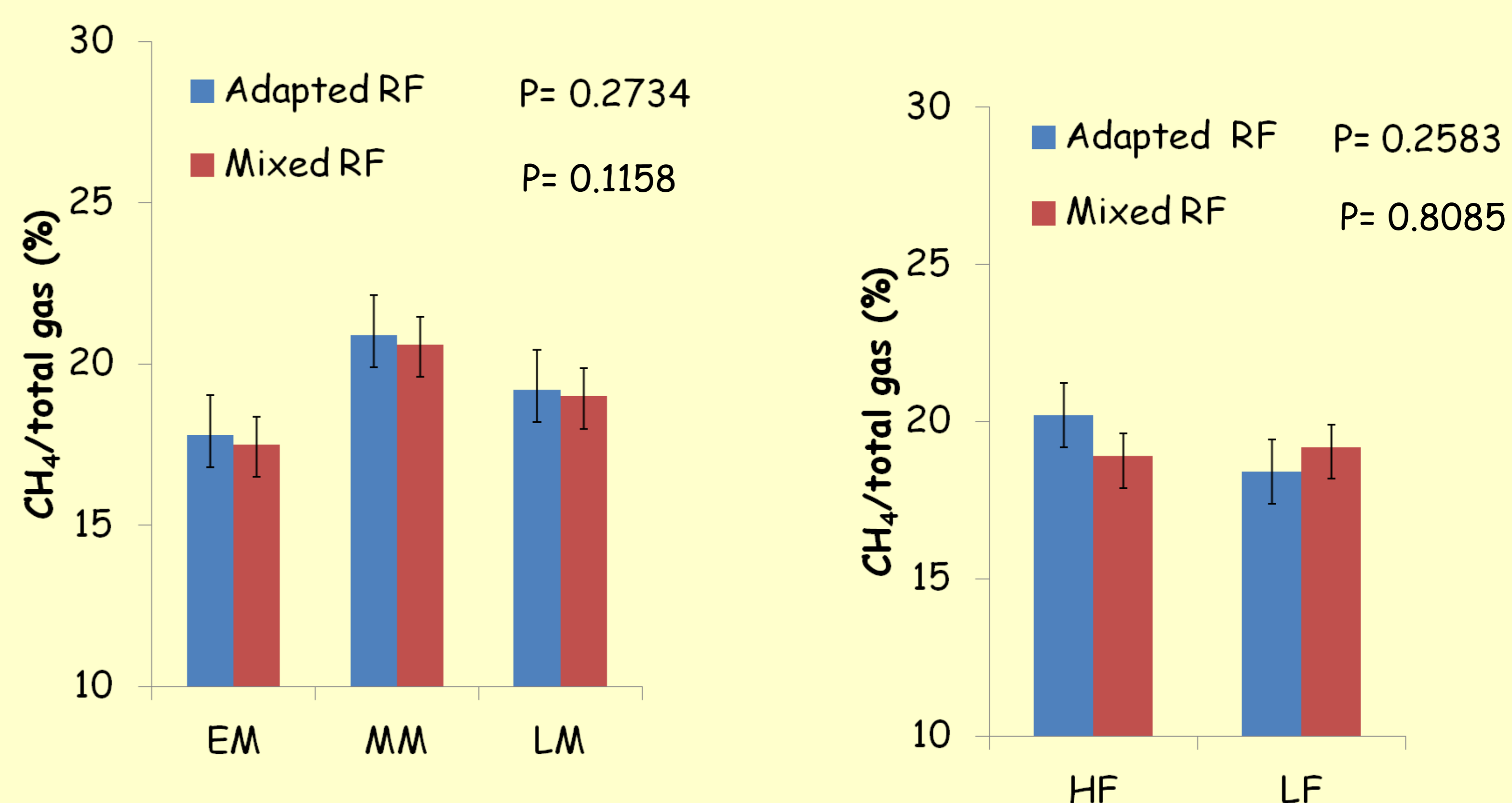


Figure 3. Methane production per total gas (%) after 72h of incubation either adapted or mixed rumen fluid.

Results

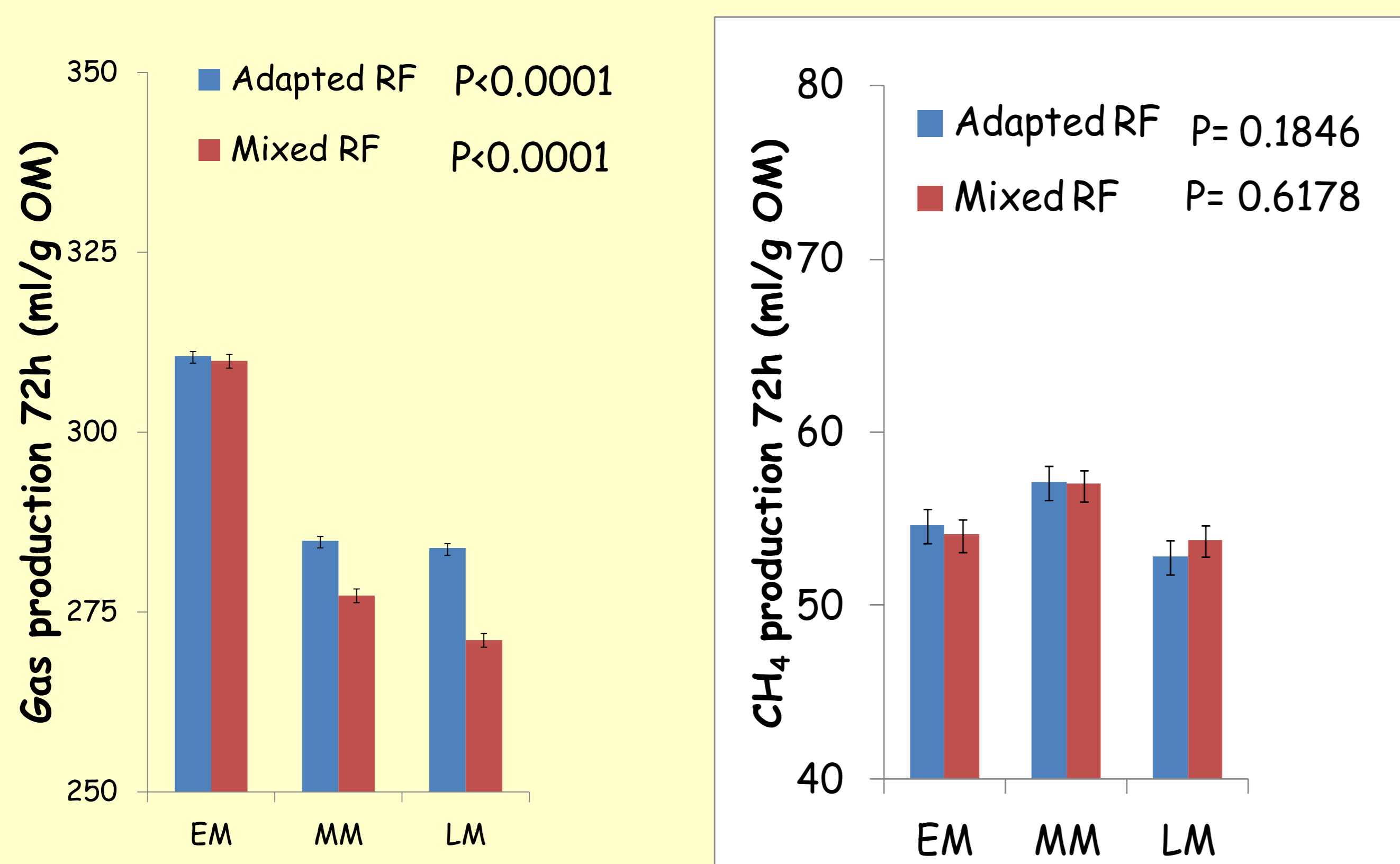


Figure 1. Gas and CH₄ production of grass silages differing in maturity after 72h of incubation either adapted or mixed rumen fluid.

Discussions

- The decline in gas production observed in this study was expected due to the reduction in plant cell wall degradability.
- According to Cone et al. (1996), the main contributor of gas production is the water soluble fraction. It can be therefore assumed that there were more rapidly fermentable carbohydrates and protein fermented in grass silage of early maturity.