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EFFECT OF AN EARLY LIFE ANTIMETHANOGENIC TREATMENT ON METHANE EMISSIONS IN GROWING LAMBS

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INTRODUCTION

Microbial colonization after birth can affect rumen function and microbiota structure later in life. Rumen development provides an opportunity for manipulation ruminal microbial ecosystem.

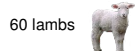
The **objective** of this study was testing whether methane emissions in growing lambs could be modulated by a non toxic antimethanogenic treatment administered in early life.

METHODS

Treatment (T)

- 1.6 mL/kg BW/day linseed oil
- 3 µL/kg BW/day garlic essential oil
- Control (C):** sugar-beet molasses (same volume as treated lambs)
- Both administered with a drencher

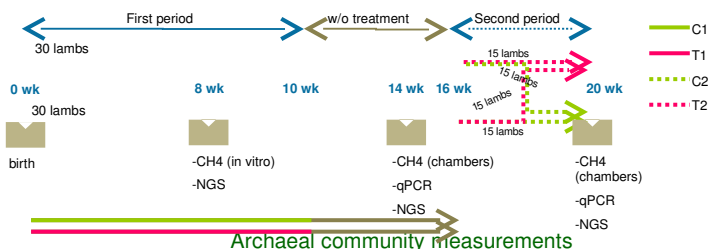
Experimental design



60 lambs

Two treatment periods:

- From birth to week 10: T1
- From week 16 to week 20: T2



Methane measurements

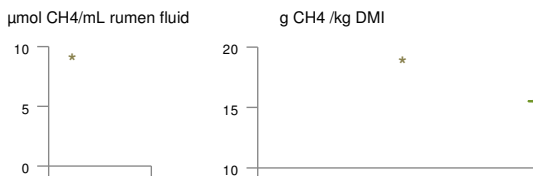
- 8 weeks** → *Ex situ* measurement (animals too small for chambers) Ruminal fluid incubated in batch fermentors
- 14 weeks** → Open-circuit respiration chambers (2-3 lambs/chamber) Emissions per kg of dry matter intake (DMI)
- 20 weeks** → Open-circuit respiration chambers (2-3 lambs/chamber) Emissions per kg of dry matter intake (DMI)

Archaeal community measurements

- Abundance of *mcrA* gene at **14** and **20 weeks** (qPCR)
- Next generation sequencing (NGS; Illumina) of archaeal amplicons (primers 349F and 806R) at **8, 14** and **20 weeks**
- Sequencing data processing QIIME and mothur
- UniFrac distances were calculated from OTU tables as a measure of dissimilarity between samples and its PCoA was represented into biplots

RESULTS

Methane measurements



- At **8 weeks** *in vitro* methane production was 24% lower in treated lambs
- At **14 weeks** there was no difference between treatments in methane emissions
- At **20 weeks** methane emissions were 13.7% lower in treated lambs. No difference was observed within the groups between the lambs treated or not in the first period

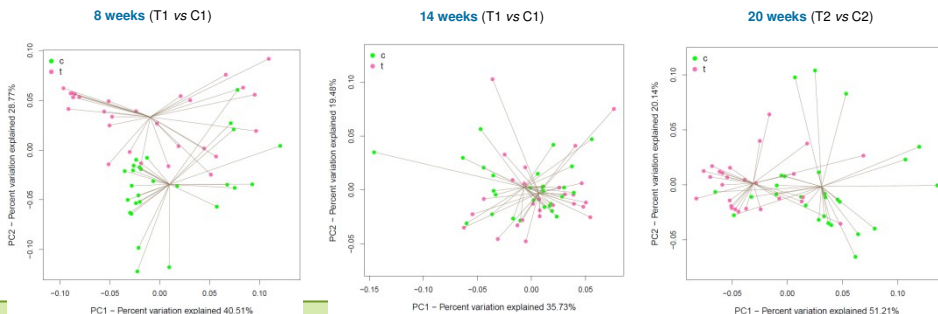
qPCR

log number of copies *mcrA* gene / mL rumen fluid



- Lower abundance of *mcrA* gene was observed at **14 weeks** in treated lambs (T1)
- No difference was observed in **week 20**

Principal coordinate analysis of weighted UniFrac distances



Archaeal community structure was particularly affected by treatment at **8** and **20 weeks**

The treatment with garlic essential oil and linseed oil, although effective for reducing methane when applied to young lambs, was not able to have a lasting effect on methane emissions.

There was an effect on archaeal community abundance four weeks after the end of the treatment, but it was not reflected in methane emissions.