

Title	Refining direct fed microbial and silage inoculants for reduction of methane emissions from ruminants (METHLAB)
Project Timeframe	Sept 2017 – Sept 2020
Countries Involved	New Zealand (AgResearch) France (INRA) Ireland (Teagasc, University College Cork) Netherlands (Wageningen University) Italy (SACCO S.r.L)
Aims	To develop lactic acid bacteria (LAB) as on-farm technologies (direct-fed microbial supplements, silage inoculants) to reduce methane emissions from ruminant livestock.
Research Highlights	• A biobank of LAB strains from New Zealand, Ireland and Italy were screened for anti-methanogen activities using a microtitre plate bioassay and identified 39 strains with >50% inhibitory activity against the methanogen indicator strain. • Lactobacillus plantarum LP58 was selected as the best potential silage inoculant strain and LP58-inoculated silages were tested in rumen in vitro assays and fed to sheep to test its effects on methane emissions. • The LP58-inoculated silages reduced in vitro methane formation slightly (2.5-3.5%) but did not reduce methane emissions from sheep. However, LP58 silage had a positive influence on ruminal volatile fatty acid profiles, significantly increasing the production of propionate both in vitro and in vivo. • Microbial community analysis indicated that LP58 silage reduced the relative abundance of one group of methanogens both in vitro and in vivo, suggesting a methanogen-specific effect. • Collaborations have been formed with international experts in LAB (Ireland, France, and the Netherlands).
Future Work	• The screening of more LAB strains via the JH1 bioassay to identify a broader range of inhibitory activities against methanogens is planned, while methylotrophic methanogen bioassays are also being investigated to broaden the types of methanogens that LAB strains can be screened against. • LAB strains with strong anti-methanogen activities, and combinations of LAB strains working together, need to be tested in rumen in vitro assays, to select more effective LAB strains for future animal trials to assess their methane reducing capabilities.