

Methane production via Microbial Digestion

This factsheet has been produced by Holbrook Landcare Network to provide land managers in this region with information to enable understanding of how methane is produced by ruminants.

Methanogenesis is the production of methane by microbes in the rumen, known as methanogens.

Reducing the number of methanogens in the rumen can reduce methane production and research is currently continuing into practical options for producers.

Reducing methane emissions from ruminant animals can contribute to reducing overall global greenhouse gas emissions and improve feed conversion efficiencies in your herd.

WHAT IS MICROBIAL DIGESTION?

Herbivorous mammals face several challenges when feeding; plant matter is tough to digest, relatively low in fat and protein and the majority of nutrients are located with tough cell walls that require special enzymes to break down. In ruminant animals, methanogens (Archaea) microbes in the rumen have the enzymes to carry out this function.

The rumen provides an excellent environment for microbial growth and fermentation and it is anaerobic (without oxygen). The fermentation provides energy, protein and B vitamins to the animal and produces methane (CH₄) as a by-product. This process is called **methanogenesis**.

RUMEN MICROBES

Typically the percentage of microbes in the rumen are:

- 40-60% bacteria
- 30-50% protozoa
- 5-10% fungi
- 3% Archaea

The proportions of microbes present vary greatly depending upon the diet of the animal.

WHY IS METHANE AN ISSUE?

Methane has a global warming potential 21 times that of carbon dioxide. Methane is an issue in livestock enterprises as enteric methane makes up 65% of all agricultural emissions in Australia.

HOW CAN METHANE BE MITIGATED?

Reducing the number of methanogens in the rumen can reduce CH₄ production. The quality of the food a ruminant eats has a direct correlation to the amount of methanogens in their rumen which in turn affects the amount of methane the animal emits. Ruminants that eat green feed and grain produce less methane than livestock consuming dry feed.



Methanogens (Archaea) are the microbes present in the rumen that are responsible for the production of CH₄.



Greenhouse Gas Factsheet Series

METHANOGENESIS

Methanogenesis is the production of methane by methanogens and is a form of anaerobic respiration that uses hydrogen (H₂) to reduce carbon dioxide (CO₂) to form methane (CH₄) and water (H₂O).



FUTURE PROSPECTS

The CSIRO and many other organisations are conducting numerous research projects trying to address the issue of methane emissions from ruminants.

One of the research projects is looking at utilising anti-microbial properties of plants.

The scientists are not looking for a single plant that can feed livestock and reduce methane. Rather, they are aiming to identify practical ways to include alternative plants in the diet of grazing animals to achieve multiple benefits, including:

- Whole-farm profitability
- Animal productivity
- Environmental sustainability

It is important to ensure that reductions in one part of the system do not stimulate higher emissions elsewhere.

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