Feeding strategies to mitigate enteric methane emission from ruminants in grasslands system

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General Overview

• Ruminants are an **essential component** in grasslands systems to provide ecosystems services\(^1,2,3\)

• Ruminants are associated with greenhouse gas production, especially **enteric methane** emissions\(^4\). Also, methane is an **energy loss** for ruminants\(^5\)

• 75% of the enteric methane comes from ruminants on **low-quality diets**\(^6\)

• There is not clear the response of methane abatement **strategies in grazing** conditions

• The objectives of this research were to **recognize and describe** enteric methane abatement practices in grazing conditions

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\(^1\)Dubeux et al., 2007; \(^2\)Knapp et al., 2014; \(^3\)Godde et al., 2018; \(^4\)Gerber et al., 2013; \(^5\)Johnson and Johnson, 1995; \(^6\)Leng, 1993
Materials and methods

Database
ScienceDirect
Springer
Scielo

Key words
“methane”, “methane emissions”, “methane production”, and “ruminant”

1371 documents
1957 - 2020

Phase 1

Phase 2

Analysis
In vitro
Confined
Grazing

Grassland management
Supplementation
Results

Publication and distribution of methane research

| Decade       | Publication number |
|--------------|--------------------|
| 1951-1960    | 10                  |
| 1961-1970    | 20                  |
| 1971-1980    | 30                  |
| 1981-1990    | 40                  |
| 1991-2000    | 50                  |
| 2001-2010    | 60                  |
| 2011-2020    | 70                  |

- Analysis: 23%
- In Vitro: 30%
- Confined: 40%
- Grazing: 7%
Effect of grassland management on methane emissions (g/kg of DM consumed) in ruminants

- Grazing intensity (high stocking rate), n=12
- Grazing intensity (low pregrazing biomass), n=6
- Grazing method (rotational), n=2
- Grazing time (inmature grass), n=5
- N fertilization, n=2
- Non-tannin legume, n=4
- Tannin legume, n=2
- Silvopastures, n=2
Effect of different supplementation strategies on methane emissions (g/kg of DM consumed) in ruminants under grazing conditions

- Concentrate, n=10
- Starch, n=4
- Oil, n=10
- Monensin, n=1
- Nitrates, n=4
Take-home messages

• There is a greater interest to understand and reduce enteric methane emissions from ruminants, although less research has been conducted in pastoral systems

• There is limited information in fertilization effect, silvopastoral systems or inclusion of legumes. Also, there are few research in supplementation

• Low pre-grazing grassland management showed more consistent reduction on CH$_4$, however, it is important ensure the persistence of forages. Additionally, concentrate, oil, and nitrate supplementation reduced CH$_4$, but life cycle and profit analysis are required to be implemented in farms

• Other abatement strategies should be evaluated in grazing conditions as supplementation (e.g., 3NOP or EO) and management (e.g., modulation of rumen microorganism) practices
Thank you

Questions

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