

Study on Methane Mitigation Strategies in Commercial Sheep farms

"Agolin and Polygain Supplementation Reduces Methane Production Without Affecting Growth and Blood Metabolites in Grazing Sheep Under Commercial Farm Conditions"

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Problem statement

Sheep production is widely practiced in Australia as a commercial farming activity that contributes significantly to meat and wool supply while supporting rural livelihoods and national agricultural productivity. Farmers rely on sheep production systems because animals can efficiently utilize pasture resources, adapt well to grazing environments, and produce high-quality meat and wool that are valued by domestic and international markets. However, sheep production is associated with substantial enteric methane emissions that contribute to agricultural greenhouse gas outputs and represent a loss of dietary energy during digestion (Prathap et al., 2021). Methane generated during rumen fermentation is produced by methanogenic microorganisms that convert hydrogen and carbon dioxide into methane, leading to energy losses that can reach up to 12% of feed intake in ruminants. Nevertheless, sheep production remains a vital component of sustainable livestock systems, and improving feed efficiency while reducing methane emissions has become increasingly important to meet environmental targets and maintain industry productivity.

This study evaluates the effects of feed additives on methane emissions, growth performance, and health indicators in grazing sheep.

Study site: Commercial sheep farm in Victoria, Australia.

Methodology: Field experiment with four lamb groups (control, Polygain, Agolin and combination; n = 50 per group), methane measurement using the GreenFeed monitoring system, sheep weighed every three weeks, and blood metabolites analysed.

The solution/Innovation

Key results/impacts

1). **Additives delivery:** Feed additives were successfully delivered through pellets to grazing lambs under commercial farm conditions.

2). Methane emissions reduction

Methane production: Methane production was significantly lower in all treatment groups (38.5 vs 35.0, 36.9, and 34.0 g/day for the Control, Agolin, Polygain and combined groups, respectively) ($P < 0.001$).

Methane intensity: Polygain (5.96%) and combined additives (9.78%) showed numerical reductions relative to control.

3). Performance and health

Body weight and average daily gain: No significant differences were observed among treatments.

Nutritional indicators: None of the treatments affected blood urea, non-esterified fatty acids or albumin levels

Liver & kidney function markers: Blood metabolites remained within normal physiological ranges, indicating no negative health effects.

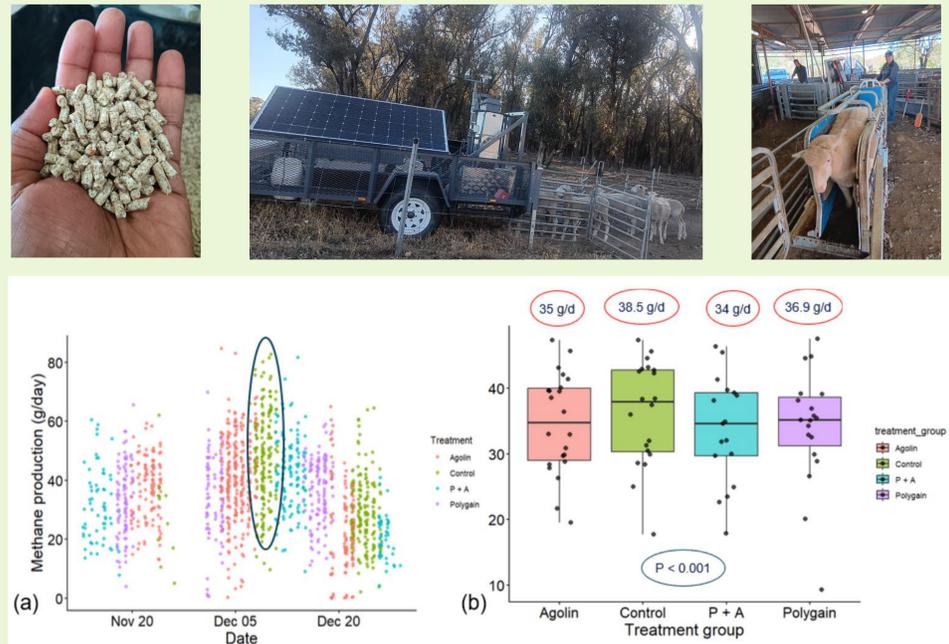


Figure 1. Effects of feed additives on methane production (g/day/animal) in grazing lambs. (a) Temporal variation of methane production across measurement periods for the control, Agolin, Polygain, and combined (Agolin + Polygain) treatment groups. (b) Boxplot showing the distribution of methane production (g/day) among treatments. Methane production was significantly lower in all supplemented groups compared with the control (38.5 vs 35.0, 36.9, and 34.0 g/day for the Control, Agolin, Polygain and combined groups, respectively; $P < 0.001$).

Scalability and regional relevance

The methane mitigation strategy can be readily scaled across grazing sheep systems through the use of commercially available feed additives such as Agolin and Polygain incorporated into standard pellet feeds. Since sheep production systems and pellet-based supplementation are widely used in Australia and other sheep-producing regions, the approach remains practical and accessible for commercial farmers. The technology requires minimal additional infrastructure and can be integrated into existing grazing and feed delivery systems without major management changes. The approach can be adopted and replicated across different farming regions through producer demonstrations, extension programs, and collaboration with feed manufacturers. Furthermore, supplement delivery through pellets can be adapted to various grazing systems and feed resources, ensuring regional relevance and supporting long-term sustainability of methane mitigation in sheep production.

Partners and donors involved

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