

# **Including biserrula chaff in the diet of sheep does not reduce methane yield**

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## **Abstract**

Biserrula (*Biserrula pelecinus L.*) is a legume with potential to be included in extensive sheep grazing systems to reduce methane production (methane/day) and methane yield (methane/intake). This study tested the hypotheses that increasing biserrula in the diet of sheep reduces acetate: propionate in rumen fluid and decreases methane yield (g methane/kg dry matter intake) from sheep. Merino wethers (n = 41) were fed one of four treatments with varying proportions of biserrula and annual ryegrass (*Lolium rigidum cv. robust*) chaff for 38 days. Daily feed intake and live weight change were measured regularly, and 23h methane production was measured in respiration chambers. Rumen fluid was collected to measure volatile fatty acids and ammonia concentrations. Sub-samples of each pasture were collected daily and freeze-dried to analyse nutritive values. In general, as the proportion of biserrula in the diet increased acetate: propionate decreased ( $P < 0.001$ ) which supported our first hypothesis, and methane production decreased ( $P = 0.05$ ). However, there was no difference in methane yield between biserrula and ryegrass groups ( $P = 0.20$ ), and our second hypothesis was rejected. The main drivers of methane production were the fibre fractions of the diet, including intakes of neutral detergent fibre, acid detergent fibre and hemicellulose (36%, 36% and 37% of variance in methane production explained, respectively). Decreasing intakes of fibre reduced acetate: propionate (44% of variance accounted for) but not methane yield. The conversion of biserrula into chaff may have volatilised the active plant secondary

compounds and thus the potent anti-methanogenic effect observed in previous *in vitro* experiments. In conclusion, the proportion of biserrula in the diet explained no additional variance in methane production to that explained by the fibre fraction. Future research should be directed to greater utilisation of the feeding value of pastures, while reducing greenhouse gas emissions from agriculture. However, the application of biserrula may not be as large as expected.