Research Report

The effect of BioMarinus supplementation on the digestibility of fibre and the nitrogen excretion of sheep fed ryegrass pasture.

Executive Summary

There is increasing interest in mitigating enteric methane outputs from New Zealand's grazing ruminants. Mitigants that preserve the environmentally positive provenance of New Zealand pasture based production systems are not common, but international research has demonstrated that fish oil in the diet of cattle and sheep reduces enteric methane. As a naturally occurring by-product of fisheries that is frequently consumed by humans, these oils are regarded favourably by the community.

While fish oil extraction is expensive, a novel process using wild caught seafood by-products that produces a shelf-stable fish hydrolysate (BioMarinus) has been pioneered in New Zealand, and this product contains a high content of oils, and quality protein. It is widely available, cost effective, and has been demonstrated to reduce enteric methane outputs in New Zealand ruminants. However, in international studies a high rate of supplementation of polyunsaturated oils to ruminants has been associated with reduced fibre digestion, thought to be a result of direct microbial effects. Also, increased crude protein (CP) content of ruminant diets is usually associated with greater nitrogen (N) excretion, which is undesirable due to community concerns about environmental impact. There were no studies examining the effect of BioMarinus on fibre digestion or N excretion, and it was considered important that these issues were formally addressed in specific research.

Therefore, an experiment was undertaken to quantify the effects of BioMarinus supplementation, at a dosage previously demonstrated to reduce enteric methane emissions, on fibre digestion and N excretion using a sheep model. The effect of BioMarinus supplementation on dry matter intake (DMI), dry matter digestibility (DMD), neutral detergent fibre digestibility (NDF DMD), urinary and faecal N excretion and N use efficiency were compared in entire ram lamb (39.5+/-1.4 kg) groups fed fresh harvested ryegrass.

Two diets were compared in consecutive, controlled, pen-feeding experiments: a control diet of *ad libitum* ryegrass and a treatment diet of ryegrass fed *ad libitum* with a 60 ml of BioMarinus daily. The experimental design was a cross-over arrangement, with two groups of lambs, and two experimental periods of seven measurement days of total faecal and urine collection after 14 days of preliminary feeding.

Supplementation of BioMarinus did not effect DMI of the lambs (P>0.05). Both treatment groups of lambs averaged a DMI of 2.8% BW and an NDF intake of 1.2% BW, which are considered high. There was no treatment difference (P>0.05) in DMD, or NDF DMD. Despite BioMarinus containing a high CP content (>40% by DM), there was no increase in urinary or faecal N excretion with BioMarinus supplementation. Using the dosage previously demonstrated to reduce enteric methane emissions, there was no observed effect in any measured intake or digestibility parameter to feeding BioMarinus, as that dose did not reduce (P>0.05) DMI, DMD, or NDF DMD. In addition, supplementation with BioMarinus did not (P>0.05) increase N excretion, however, N use efficiency was increased (P>0.05).

Conclusions

Contrary to some previous international reports of the effect of fish oil fed to ruminants, there are no apparent digestibility or N excretion disincentives to feeding the New Zealand fish hydrolysate BioMarinus as an enteric methane mitigant. The supplementary dose of BioMarinus previously demonstrated to reduce enteric methane does not appear to reduce intake or rumen digestion of fibre, and therefore animal production is unlikely to be adversely impacted. BioMarinus also appears to have no effect on N excretion losses, which may be the result of increased animal production, through increased metabolisable energy and metabolisable protein supply, capturing more dietary N with greater liveweight gain.

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