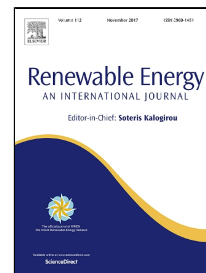


# Accepted Manuscript

Upgrading grass biomass during ensiling with contrasting fibrolytic enzyme additives for enhanced methane production.

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3  
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14

## 15 **Abstract**

16 The aims were to quantify the effects of applying fibrolytic enzymes at ensiling on conservation  
17 characteristics and specific methane (CH<sub>4</sub>) yields (SMY) per unit mass, and per unit land area. At  
18 two stages of primary growth, four replicate plots of two species (perennial ryegrass and timothy)  
19 were subjected to nine treatments, an untreated control and four fibrolytic enzymes (ENZ 1 - 4)  
20 applied at two enzyme dosage rates (low and high) prior to ensiling. Silage SMYs were  
21 subsequently determined in an *in vitro* batch anaerobic digestion test. Generally, applying fibrolytic  
22 enzymes at ensiling reduced total fibre compared to control silages, which consequently enhanced  
23 mass-SMY and area-SMY. However, the impact on fibre, mass-SMY and area-SMY differed  
24 depending on both grass species and growth stage at harvest, with no single enzyme being  
25 consistently superior. Thus the potential of enhanced methane output with added enzymes at  
26 ensiling is both fibrolytic enzyme and grass substrate specific.

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