

Biogas from grass (RMIS 6254)

The long-term trend of rising cost and limited supply of mineral oil, together with the greenhouse gas implications of burning fossil fuels, necessitate the development of alternative sources of renewable, environmentally benign energy provision. Biogas technology (anaerobic digestion, AD) is one component of a suite of responses to this challenge.

Grass is overwhelmingly the most economic feed for ruminants in Ireland and our grassland is capable of meeting a substantially greater demand than at present. Farmers and contractors would provide the grass to meet an increased demand (including for anaerobic digestion – AD) if economically incentivised to do so.

Much of the design and operation of on-farm AD has focused on optimizing the use of forage maize as the biomass source. These systems are not ideally suited to grass digestion and result in constraints to the more widespread use of grass. Thus, appropriate digester technologies, operational parameters and possible pre-treatments are required to improve grass digestion in continuously stirred tank reactors and more novel leach-bed reactors.

The aims of this project are to:

1. Develop suitable techniques for assessing the biological methane potential (BMP) of relevant farm-produced feedstocks.
2. Identify grasses (species and growth stage) best suited to biogas production.
3. Quantify the effects of ensilage on the methanogenic potential of chosen herbage and on methane output/ha.
4. Explore the potential of fibrolytic enzymes applied at ensiling to increase the methanogenic potential (or the rate of methanogenesis) of chosen herbage.
5. Using laboratory-scale continuous fermentation reactors, confirm the relative effects on methanogenesis of a sub-set of grass and silage treatments that will be assessed for BMP.
6. Quantify if added micro-nutrients or manure can maintain the efficiency of methanogenesis during the long-term digestion of herbage.
7. Assess the potential of rumen contents as an inoculum for anaerobic digestion.
8. Identify optimal operational parameters for the anaerobic digestion of grass in a continuously-stirred tank reactor and a novel leach-bed reactor.

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