Synergies from co-digestion of grass silage with other feedstocks

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1. Introduction

- Ireland has 4.2 million hectares of agricultural land.
- 1.7 M t of dry matter (DM) is available in excess of livestock requirements (McEniry et al., 2013).
- 10% of the Ireland’s grassland area could fuel up to 55% of all passenger cars with compressed biomethane (Wall et al., 2013).
- In 2010 there were 1.07 M dairy cows in Ireland. During the 20 weeks winter storage period of slurry these cows can provide 7.07 M t DM/annum (Wall et al., 2013).

Ireland’s agricultural land utilization

2. Objectives

- Identify the optimal growth stages of grass and legume silages and the optimal mixture with cattle slurry for biomethane production.
- Undertake a full cost analysis of biogas/biomethane production system based on the silage and slurry feedstock studied above.
- Undertake a full survey of a farm scale anaerobic digester producing biogas from grass silage and cattle slurry.
- Identify the optimal growth stages with cattle slurry.
- Addition of slurry to grass silage can provide these essential nutrients.
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3. Co-digestion of grass and red clover silages of different growth stages with cattle slurry

- Grass
- Red clover
- Anaerobic batch digestion

4. Co-digestion of different slurry types with grass silage of different growth stages

- Slurry
- Grass
- Anaerobic batch digestion

5. Economic modelling of biogas yield from the co-digestion of grass silage and slurry

- Crop
- Time of harvest
- Silage yield & cost
- Slurry yield & cost
- Total silage & slurry cost
- Biogas yield cost

6. LCA of anaerobic digester (to be built at Teagasc Grange) fed with grass silage and slurry mixture

- Grass
- Slurry or manure
- Gathering animal manure
- Cut grass and ensiling
- Transport
- Biogas plant
- Engine
- Digestate
- Electricity and heat
- Fertilizer

7. References

- Wall, D.M.; O’Kiely, P.; Murphy, J.D. (2013) The potential for biomethane from grass and slurry to satisfy renewable energy targets. Biosource technology 149: 425-431

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