



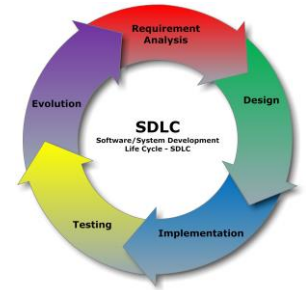
Synergies from co-digestion of grass silage with other feedstocks

Himanshu



Introduction

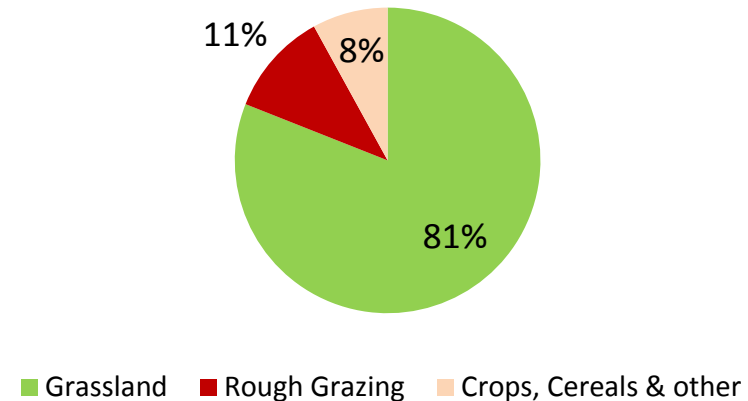
- 2003-2007: Engineering Biotechnology
 - Uttar Pradesh Technical University, India
- 2007-2010: Software Engineer
 - Infosys, India
- 2010-2013: MSc. Water Science
 - University of Duisburg-Essen, Germany
 - Internship: Max-Planck Institute for Chemical Ecology, Jena
 - How plants perceive terrestrial gastropods?
 - Master thesis: Ingenieurgesellschaft Prof. Dr. Sieker mbH, Berlin
 - Urban storm water management
- 2014-Present: PhD
 - Teagasc, Ireland and University college cork, Ireland



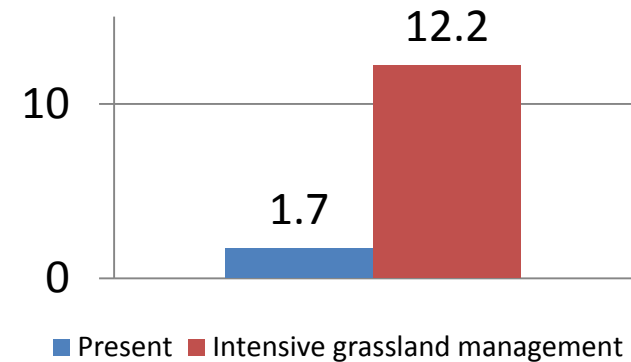
Introduction

- Ireland has 4.2 M ha of agricultural land.
- 1.7 M t of dry matter (DM) in excess of livestock requirements (McEniry et al., 2013).
- Intensive grassland management → Up to 12.2 M t DM/annum average by more (McEniry et al., 2013).
- 10% of Ireland's grassland area → Fuel up to 55% of all passenger cars (Wall et al., 2013).
- In 2010 there were 1.07 M dairy cows → 7.07 M t DM/annum for 20 weeks winter storage period of slurry (Wall et al., 2013).
- Long term mono-digestion of grass silage can suffer due to a deficiency in essential nutrients
 - Addition of slurry can provide these nutrients.
- Co-digestion of silage and slurry may produce synergistic effects providing higher biogas yield compared to mono-digestion of silage or slurry.

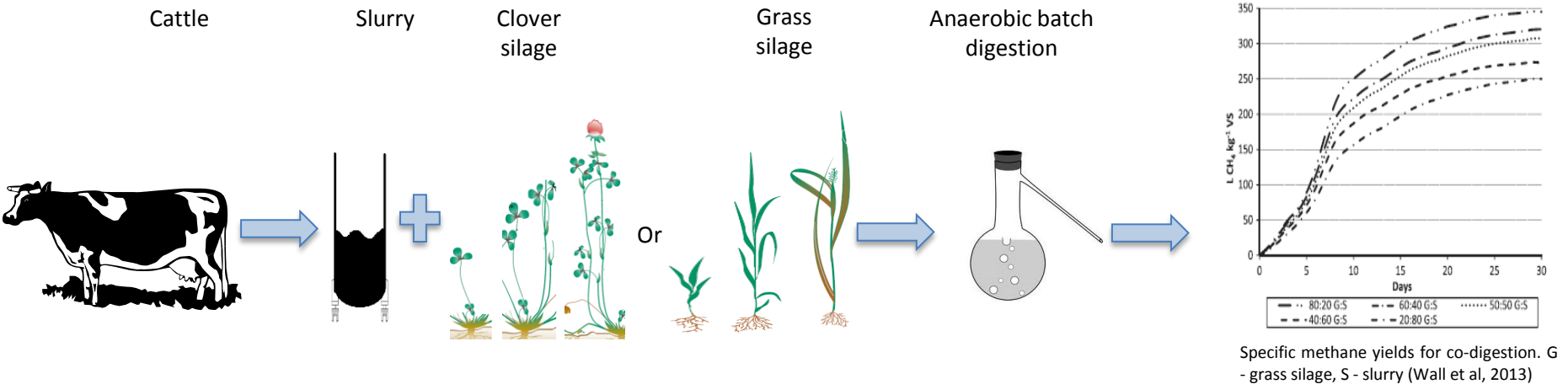
Ireland's agricultural land utilization



Grass silage in excess of livestock requirements

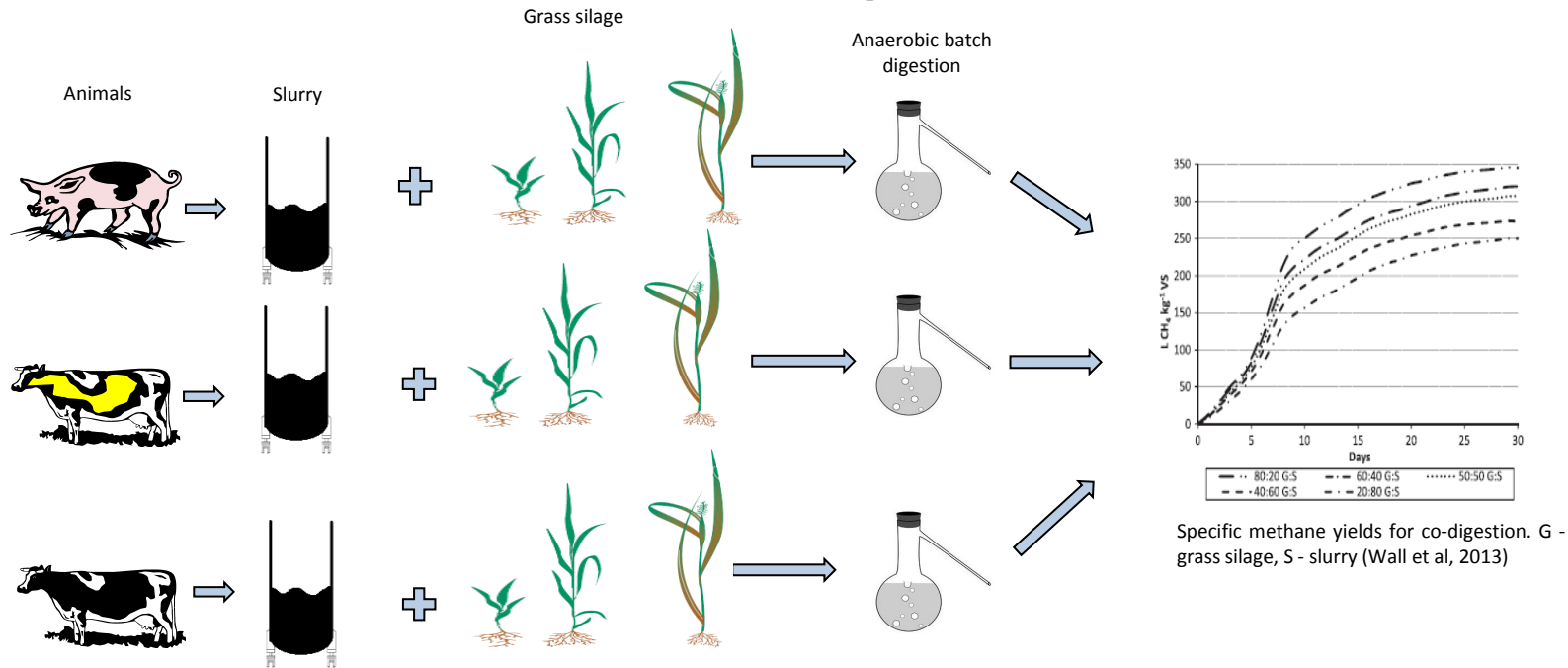


Co-digestion of grass/red clover silages with cattle slurry



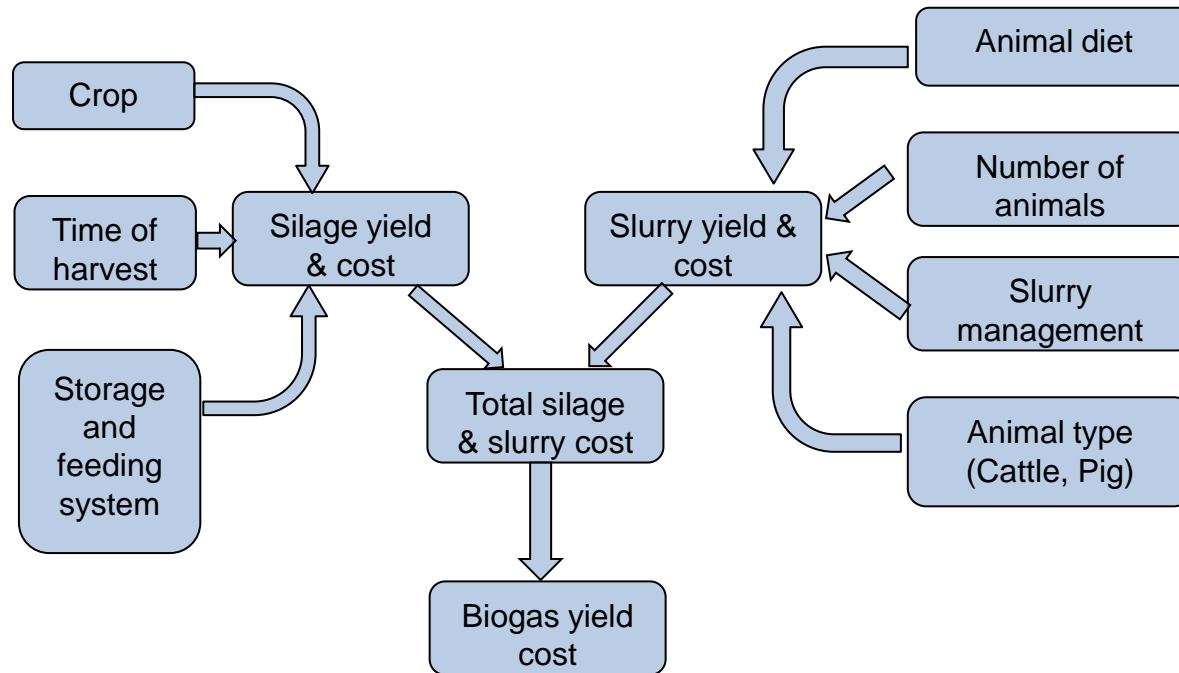
- Impact of different silage types → Grass and legume
- Impact of different growth stages → Three growth stages
- Investigation of synergistic association by co-digestion of silage and slurry

Co-digestion of different slurry types with grass silages

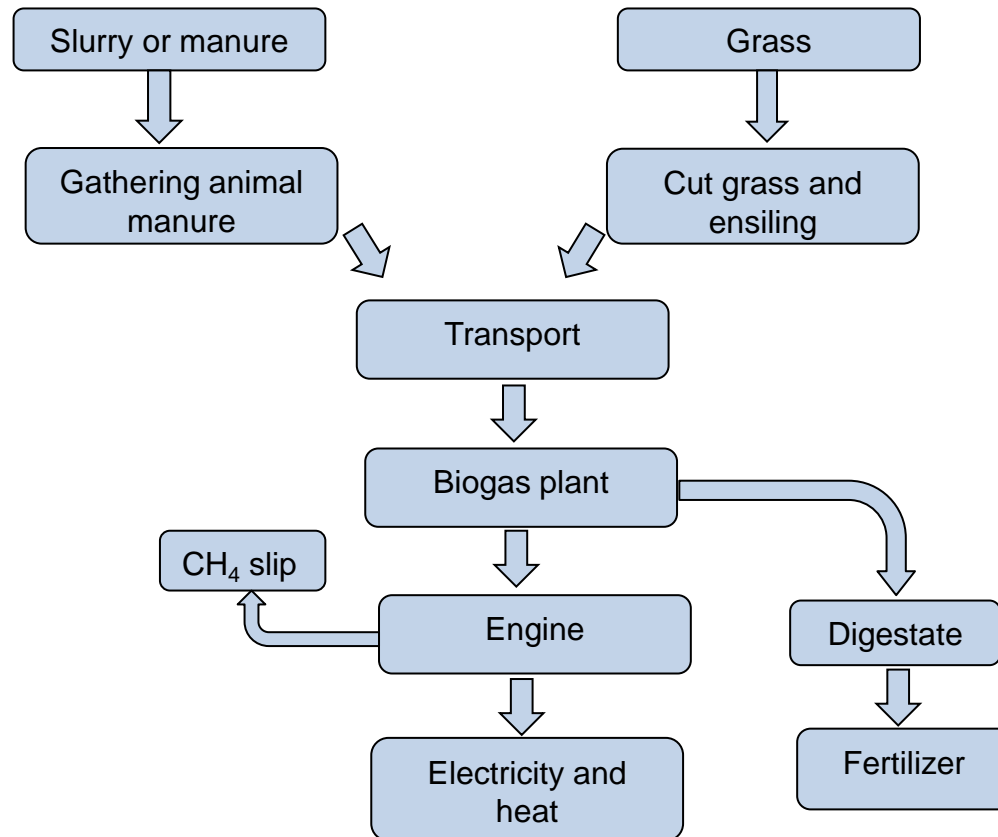


- Impact of different slurry types → Pig and cattle
- Impact of different growth stages → Three growth stages
- Investigation of synergistic association by co-digestion of silage and slurry

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



LCA of anaerobic digester fed with grass silage and slurry mixture



Question?



References

- McEniry, J.; Crosson, P.; Finnan, E.; McGee, M.; Keady, T.W.J.; O'Kiely, P. (2013) How much grassland biomass is available in Ireland in excess of livestock requirements? *Irish Journal of Agricultural and Food Research* **52**
- Wall, D.M.; O'Kiely, P.; Murphy, J.D. (2013) The potential for biomethane from grass and slurry to satisfy renewable energy targets. *Bioresource technology* **149**: 425-431

Thanks!!

