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Canadian Livestock Production Emissions

In 2005, nearly 75% of Canadian agriculture sector emissions were from livestock production when on-farm fuel use is excluded from the sector total. Since this time, livestock's contribution to agriculture emissions has dropped to approximately 60%. A decline in cattle populations and a continued increase in fertilizer use has reduced livestock emissions while crop production emissions grow.[1]

For the first time, total agricultural emissions consist of equivalent proportions of CH_4 (from livestock production) and N_2O (mainly from crop production). The shift from grazing cattle production to the production of annual crops has also contributed to less carbon being sequestered in agricultural soils.[ibid]

Enteric Fermentation

The production of methane as part of the normal digestive process of herbivores. 75% of livestock sector emissions are from enteric fermentation. Almost all (96%) of those emissions came from cattle and dairy.[ibid]

Reductions in enteric fermentation for both cattle and dairy require changes in feed to reduce the amount of methane emitted. Improving forage quality, changing feed ingredient proportions and the use of feed supplements that affect the gut bacteria that emit methane have been shown to drastically reduce methane emissions, with studies showing reductions from 40% - 75%.[2]

Manure Management

Both CH_4 and N_2O are emitted during the handling and storage of livestock manure. The magnitude of emissions depends on the quantity of manure, its characteristics, and the type of manure management system. In general, poorly aerated manure management systems generate high CH_4 emissions and well-aerated systems generate high N_2O emissions.[1]

Manure management emissions can be reduced by implementing existing technologies and management practices. Anaerobic digestion is the most effective option which processes manure and food waste in an enclosed vessel with the aid of micro-organisms in an oxygen deprived environment. Anaerobic digestion produces biogas, which consists primarily of methane and carbon dioxide, and can be "upgraded" into a renewable natural gas that is suitable for distribution through existing utility companies.[3]

FortisBC, for example, already sources "renewable natural gas" from several BC dairies that have installed anaerobic digesters to manage manure and feed waste — these systems offer an additional revenue stream for dairy producers, reduces GHG emissions and can reduce fertilizer input costs by allowing for improved re-capture and application of nutrients contained in manure. Fortis BC customers can choose to purchase renewable natural gas sourced from biogas at a higher rate than fossil-fuel based natural gas, with an option to select from 10-100% renewable sourcing.[4]

References:

[1] Environment and Climate Change Canada (2017) *National Inventory Report, 2011 - 2016* canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/inventory.html

[2] Haque, Najmul (2018) Dietary manipulation: a sustainable way to mitigate methane emissions from ruminants, J Anim Sci Technol. 2018; 60: 15. doi: 10.1186/s40781-018-0175-7

[3] Global Methane Initiative (2013) *Successful Applications Of Anaerobic Digestion From Across The World* globalmethane.org/documents/GMI%20Benefits%20Report.pdf

[4] Cobble Hill Biogas (2019) *Our On Farm Bio Gas Plant* cobblehillbiogas.com