Economic and Environmental Tradeoffs of Ontario's Dairy Farming Systems

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Background :

Ontario contributed 702Mt of CO_2eq greenhouse gas emissions which is 24% of Canada's annual total.

Of this 24%, 6% is from the agriculture sector.

Dairy sector in Ontario emits 2.64Mt CO_2eq emissions per year which is one quarter of total agricultural emissions in Ontario.

Sources: Enteric fermentation (48%) – CH_4

Soil (24%) – N_2O

Manure management (18%) – N_2O, CH_4

Energy consumption (11%) – CO_2

Economic Problem :

Need to identify the means of reducing greenhouse gas emissions from Ontario's dairy farming system while minimizing the impact on the economic performance of the sector.

Objectives :

The purpose is to determine the trade-offs between economic and environmental efficiencies in the dairy sector Ontario. Specific objectives are to:

i) estimate economic and environmental efficiency

ii) identify the barriers to achieving economic and environmental efficiency

iii) identify the incentives that would increase the likelihood of achieving an economically and environmentally efficient dairy farming system

Method :

Stochastic frontier analysis using a directional distance function approach but with good outputs (milk, crops and livestock) and a bad output (GHG emissions).

Data :

•169 dairy farms for 2010-2012 from Ontario Dairy Farmers Accounting Project (ODFAP)

•Financial and production variables

•GHG emissions for each farm calculated using IPCC (2006) model and with ODFAP data

Results (Preliminary) :

❑Green house gas intensity

Figure 1: Green house gas intensity distribution from different sources

Farms emitted on average ,

•2.5 times higher enteric CH_4 as compared with manure CH_4

• 3 times higher soil N_2O compared with indirect N_2O

❑Technical efficiency

• The mean technical efficiency is **75 %**

• The highest efficient farm has a TE of **99%** and the least efficient farm has a TE of **33%**

❑Tradeoffs

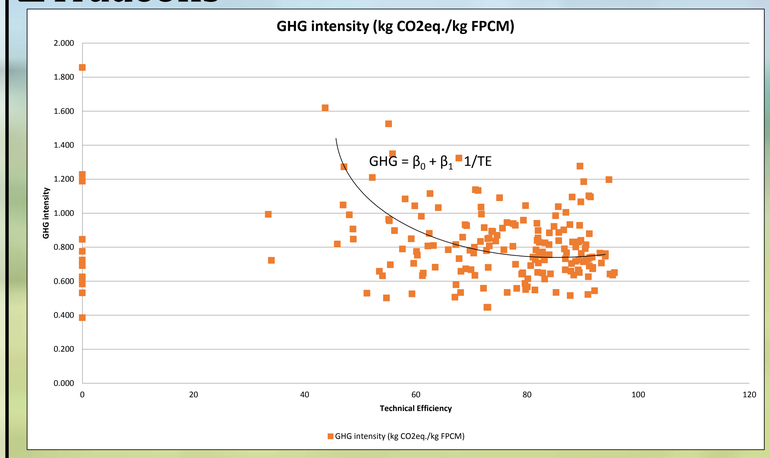

Figure 2 : Changes of greenhouse gas intensity (GHG) with Technical efficiency (TE) from 2010 -2012

•There is a decreasing trend between both TE and GHG intensity

•The smaller change in technical efficiency results large changes in the GHG emissions

•There are likely no tradeoffs

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