

Greenhouse Gas Emissions and Agriculture

A CFFO Policy Statement

1. Global Warming

- 1.1 According to many scientists, the earth's atmosphere is warming due to human activities. Global warming is believed to be caused by the build-up of greenhouse gas (GHG) emissions, which trap long-wave radiation emitted from the earth's surface. The major GHG emissions related to agriculture include carbon dioxide (CO₂)¹, methane (CH₄)² and nitrous oxide (N₂O)³. As these gases accumulate, scientists suggest that a greenhouse effect occurs leading to a warmer climate with potentially more extreme and variable weather events.
- 1.2 Global warming and its causes are difficult to quantify scientifically and several notable climatologists reject the theory.
- 1.3 Worldwide concerns about potential global warming resulted in a major international conference held in Kyoto, Japan in 1997. There, Canada and other industrialized nations agreed to reduce GHG emissions by 2008-2012 to 6% below 1990 levels.
- 1.4 Canada is currently evaluating methods to achieve this objective.
- 1.5 Since the Kyoto Protocol was signed, Canadian emissions of GHG have increased steadily. If GHG emissions continue to increase at the same rate, by 2012 Canada will need to reduce its annual emissions by about 20% to reach the emissions target.
- 1.6 As farmers, we do not know if GHG emissions and global warming is a net benefit or problem for Ontario agriculture. To date, few studies have forecast the changes which GHG emissions and global warming could have on Ontario agriculture. Key factors determining future changes include the effect of GHG emissions on mean average seasonal temperatures, water availability, extreme climatic events and how farmers respond to the changes. If global warming resulted in milder winters with similar current summer temperatures and rainfall patterns, a longer growing season could result. This would be positive for Ontario growers. However if global warming caused warmer summer temperatures and more sporadic precipitation, this could negatively affect crop production.
- 1.7 Whether or not GHG emissions are positive for Ontario agriculture we accept that they are an issue for society, for example they result in poorer air quality.

¹ Carbon dioxide (CO₂): Carbon dioxide is produced from the decay of organic matter, respiration by plant and animal life, as well as through the combustion of materials and fuels. This gas is removed from the atmosphere through photosynthesis and absorption by the ocean.

² Methane (CH₄): Although there is less methane than carbon dioxide in the atmosphere, methane is a more effective heat-trapping gas. It is derived from the decay of matter without the presence of oxygen. Primary sources include animal digestive processes, as well as manure storage and handling.

³ Nitrous oxide (N₂O): Soils and oceans are the primary natural sources of nitrous oxide. Human contributions may take place through soil cultivation, fertilizer and manure application, and by burning organic material and fossil fuels.

- 1. In principle CFFO is supportive of Canada's agenda to reduce GHG emissions. CFFO acknowledges that as farmers, depending on our choice of practices, we both contribute to the GHG emissions and reduce them. As stewards we have a responsibility to better manage our impact on the creation. This is important regardless of the accuracy of climate change science, the limited hope for wide international support of the Kyoto Protocol and the lack of certainty that GHG emission reductions can reverse or prevent climate change trends.**

2. Agriculture's Contribution

- 2.1 Nitrous oxide, methane and carbon dioxide are the main greenhouse gases emitted by the agriculture. Although carbon dioxide is the main greenhouse gas emitted by other industries, the agriculture sector primarily emits methane from livestock and nitrous oxide from fertilizer. Because emissions from agriculture are different, strategies that work in other industries, such as reducing fuel consumption won't be the entire solution for agriculture.
- 2.2 According to data collected and published by the Agriculture and Agri-Food Climate Change Table⁴ primary agriculture's share of GHG emissions is: 64 Mt (million tons, 1996) of CO₂ equivalents (9.5% of total Canadian GHG emissions)⁵. Adding the agri-food sector's emissions and farm fuel consumption increases the industry's total emissions to 12%.
- 2.3 Primary agricultural activities which contribute directly to GHG emissions include:
 - 58% agricultural soil activities
 - 14% livestock manure management
 - 28% enteric fermentation in domestic livestock
- 2.4 The relative importance of GHG emissions from primary agriculture are:
 - 1% Carbon Dioxide
 - 38% Methane (21 times the warming potential of CO₂)
 - 61% Nitrous Oxide (310 times the warming potential of CO₂)

- 2. In principle, CFFO accepts that agriculture's share of GHG emissions is significant enough for the agriculture sector to develop a GHG reduction strategy.**

⁴ The Agriculture and Agri-Food Table is one of 16 Tables of the National Climate Change Secretariat, established by the Federal Government in 1997 to develop a strategy to reduce GHG emissions.

⁵ The science behind agriculture's share of GHG emissions is much less certain than energy based industries, which emit carbon dioxide. Special models were developed to account for the release of methane and nitrous oxide from natural processes originating from many different production systems and environments. Figures are taken from reports prepared by the Agriculture and Agri-food Climate Change Table.

3. Education

- 3.1 GHG emissions and global warming is an emerging issue for the farm community. It is important for producers to increase their knowledge on this subject and to become aware of problems and solutions related to the issue.
- 3.2 The Environmental Farm Plan (EFP) is a well-established and respected training vehicle in the farm community. It would be very positive for EFP participants to be able to understand their farm's GHG emission contribution and identify appropriate reduction strategies when doing an EFP action plan .

3. CFFO asks OFEC to create a module or modify an existing module of the EFP to include GHG emissions from our farms.

4. Research

- 4.1 The research directed toward GHG reduction in agriculture is in a very preliminary phase and significant knowledge gaps exist.
- 4.2 More research is needed to better understand and quantify the GHG emissions, which result from our farms.
- 4.3 Further research is required to better understand which farm practices and technologies, if employed could reduce GHG emissions the greatest and in the most economical manner.
- 4.4 Research is needed to discover new techniques and technologies, which will be more effective in reducing GHG emissions than current options.

4. The CFFO supports the creation of research funds managed by the agricultural sector to assist in the research and development of practices and technologies for GHG emission reduction, which are economically feasible. Research should focus on methods to reduce net GHG emissions in the short and long terms. Emphasis should be placed on the areas of: crop nutrient management, fuel emission management, livestock feed management, manure management, carbon sequestration⁶ and biofuels.

5. Options for GHG Reduction

- 5.1 A significant number of options to reduce or offset GHG emissions exist currently. GHG emissions can be reduced by employing technologies, which cause lower levels of methane or nitrous oxide to be generated.

⁶ The net removal of CO₂ from the atmosphere into long-lived pools of carbon. The pools can be living, aboveground biomass (e.g., trees), products with a long, useful life created from biomass (e.g., lumber), living biomass in soils (e.g., roots and microorganisms), or organic carbon in soils and deeper subsurface environments. It is important to emphasize that increasing photosynthetic carbon fixation alone is not enough. This carbon must be fixed into long-lived pools so that there is a net increase of carbon in an ecosystem.

- 5.2 Methane is produced by ruminants and during the decomposition of manure under oxygen deficient conditions. Best Management Practices (BMPs) to reduce methane emissions include:
- using feed additives to increase feed conversion efficiency and inhibit methane production
 - using solid rather than liquid manure systems
 - aerating manure during composting
- 5.3 Nitrous oxide emissions are primarily generated by agricultural soil activities such as fertilizer application and other cropping practices. BMPs to reduce nitrous oxide emissions include:
- matching fertilizer and manure applications to plant needs
 - optimizing nitrogen uptake efficiency with the most advantageous placement and timing
 - using cover crops
- 5.4 The process of photosynthesis incorporates carbon dioxide from the air into plant dry matter. Part of this carbon will be stored in the soil when the plant matter is returned to the soil and is gradually broken down. Thus agricultural soils, acting as carbon sinks could help reduce levels of carbon in the atmosphere. BMPs to store carbon in the soil include:
- using no-till/reduced tillage vs. conventional tillage
 - continuous cropping vs. summer fallow
 - including perennial legumes in crop rotations
 - converting marginal lands to wood lots
 - using cover crops
- 5.5 Fuel consumption in agriculture can be reduced by developing more efficient engines. Cleaner fuel or fuel with a higher octane level will reduce emissions.
- 5.6 There are many BMP's which could be adopted by Ontario agricultural producers which have the potential to reduce GHG emissions. Many of these practices are economical to employ. As well, many BMP's are stewardship practices, which are currently encouraged by CFFO.
- 5.7 Many BMP's that have the potential to reduce GHG emissions also have the potential to have significant other environmental benefits. For example, trees planted as carbon sequestration can also maintain biodiversity, reduce soil erosion, reduce wind erosion and improve fish habitat by cooling streams.

5. CFFO supports a voluntary GHG emission reduction strategy whereby producers would reduce GHG emissions by adopting BMPs.

- 5.8 Agricultural soils are currently not included in the Kyoto protocol as recognized carbon sinks. Lobbying is occurring to change this designation. The inclusion of soils as carbon sinks is an appropriate way to recognize agriculture's contribution to the reduction of GHG in the atmosphere.

- 5.9 We do not equate the creation of carbon sinks with GHG emission reduction. We see them as an important stewardship initiative but not a substitute for reducing emissions. Carbon sinks should not be seen as an alternative to lowering emissions. We recognize their value but not the trading in them.

6. CFFO supports the recognition of agricultural soils as carbon sinks.

7. CFFO does not support the trading of carbon credits.

- 5.10 We don't want others to unload their responsibility to reduce pollution by accessing our willingness to do so.
- 5.11 The focus in agriculture needs to be on nitrous oxide and methane, not carbon sequestration.

6. Incentives & Fee for Service

- 6.1 Adoption of new technologies is usually a gradual process among producers. Even those producers who adopt new technologies with clear economic benefits experience a learning curve. Monetary incentives encourage producers to try new technologies and help them justify the learning experience before the technology becomes economical.
- 6.2 In the case of GHG emission reduction there is a public good to be gained for the long-term. It is reasonable to ask that monetary incentives in the form of annual payments be provided to help encourage producers to adopt and maintain BMPs.
- 6.3 Agriculture provides a variety of benefits for society. Both sequestering carbon and reducing methane and nitrous oxide emissions are substantial benefits to Canada's emerging commitment to reduce GHG emissions. A fee for service should be established for those providing this benefit to society.

8. CFFO supports:

- **Enhancement of the Environmental Farm Plan by establishing an additional grant for initiatives (as designated by a farm's EFP action plan), which reduce GHG emissions.**
- **The development of annual environmental payments for land managed using BMP's to reduce GHG emissions.**
- **The development of a grant program to purchase the technology needed to reduce GHG emissions.**

**Adopted
Provincial Board
Christian Farmers Federation of Ontario
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