Reducing GHG emissions through

GRASSLAND AND PASTURE MANAGEMENT

Effet de serre — Programme d'atténuation des GES — On coupe les gaz

Greenhouse gases (GHG) contribute to global warming. Agriculture, with approximately 10 per cent of the total emissions, produces less GHG than many other sectors of the economy, such as transportation and industry. However, agricultural activities still remain a significant source of GHG, therefore we have to explore the possibilities of reducing emissions. Greenhouse gases are responsible for more than half of the nitrous oxide (N_2O) emissions, a third of methane (CH_4) emissions and a small quantity of carbon dioxide (CO_2).

Fédération des producteurs de bovins du Québec

Cattle operations can participate in the reduction of GHG emissions through their grassland and pastures management practices. The results would be agricultural production that is more efficient and more respectful of the environment.

N_2O, a greenhouse gas with a warming potential 310 times more powerful than CO_2

Nitrogen is found in nature in many forms and is constantly modified: it is the cycle of nitrogen. Agricultural activities influence that cycle.

Micro-organisms transform nitrogen found in crop and manure residues, mineral fertilizers and in the soil. These transformations (nitrification and denitrification) release nitrogen into the air. The quantity of N_2O released by transformations performed by micro-organisms depends on climatic factors, mainly precipitation and evaporation, and on the presence of oxygen and the availability of carbon in the soil.

Nitrogen not used by plants and micro-organisms is also a source of N_2O. Anaerobic conditions (absence of oxygen) induce the emission of N_2O.

Agricultural nitrogen lost by leaching (nitrates) and volatilization (ammonia) can end up in watercourses and non agricultural land, which can then emit N_2O.

To reduce N_2O emissions, agricultural practices aimed at controlling the accumulation of nitrogen must be adopted:

- Avoid the accumulation of free nitrates
- Avoid the development of anaerobic conditions
- Avoid the leaching of nitrogen into watercourses

Strategies to reduce N_2O, or nitrogen management

Synchronize the availability of nitrates with plants' nutritional needs

- Avoid excessive doses of fertilizer and manure by taking into account their composition and concentration and previous crops
- Apply organic and mineral fertilizers in the spring rather than in the fall
- Reduce the input of organic and mineral fertilizers

Reduce the risk of anaerobic condition in the soil

- Ensure proper soil drainage
- Reduce and avoid soil compaction
- Have adequate surface drainage (e.g. levelling of the ground)
- Install underground drainage (if applicable)

Increase grassland and pasture productivity

- Improve yield to use nitrogen adequately
- Restore permanent grasslands
- Avoid overgrazing weakened plants

Photos : A. Choquette / FPBQ

Canadian Cattlemen's Association
Les Producteurs laitiers du Canada
Conseil de conservation des sols Canada
Canadian Pork Council / Conseil canadien du porc
Agriculture et Agroalimentaire Canada
Agriculture and Agri-Food Canada

In collaboration with Centre de recherche et de développement en agriculture (CRDA)

CH_4, a fermentation gas

Ruminants' digestion and the fermentation of liquid manure are the biggest producers of methane gas. These are two conditions where the decomposition of organic matter is performed in the absence of oxygen.

To reduce CH_4 emissions by the digestive system, grasslands and pastures should provide cattle with high quality forage (highly digestible).

Strategies to reduce CH_4

Improve the quality of forages

- Manage pastures using rotational grazing
- Maintain 30 per cent of legumea in grassland and pastures
- Avoid overgrazing
- Harvest at earlier stages of development

Reduce the risk of anaerobic conditions in the soil.

Grasslands and pastures: very useful to capture CO_2

Even though agricultural activities contribute to CO_2 emissions, they primarily allow for the capturing of carbon. Cultivated plants and trees convert CO_2 into vegetal matter. Maintaining and even increasing organic matter content can be ensured by planting a permanent vegetal cover.

Organic matter of the soil constitutes the only sustainable pool of carbon in agricultural ecosystems. This pool is not constant. It evolves according to the quantities of added organic matter (crop residue, manure and others) and those lost in decomposition. The organic matter content of the soil used to capture carbon should be maintained and even increased.

Strategies to reduce CO_2 in the atmosphere

Reduce the consumption of fossil fuels

Encourage the addition of organic matter in the soil

- Increase the percentage of the farming operation's acreage in perennial crops
- Increase crop yields (good drainage, nutrient management, adequate choice of species and mixes according to climate and soil, etc.)

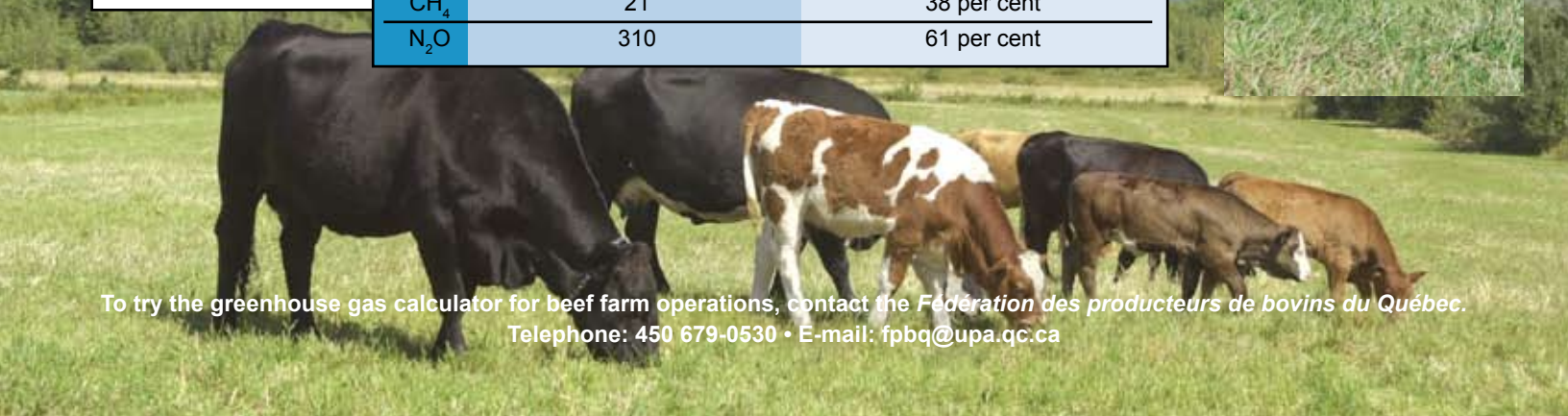
Increase the carbon pool

- Plant windbreaks
- Plant trees, bushes and other perennial crops on fragile soil

GHG in agriculture : facts

The contribution of agriculture to the Canadian emissions of greenhouse gases (GHG) is estimated at 10 per cent. The GHG from farm sources originate mainly from microbial activities: ruminant digestion, manure and agricultural soil. These gases include:
nitrous oxide (N_2O)
methane (CH_4) and
carbon dioxide (CO_2).

Gas	Warming potential	Agricultural contribution
CO_2	1	<1 per cent
CH_4	21	38 per cent
N_2O	310	61 per cent



To try the greenhouse gas calculator for beef farm operations, contact the *Fédération des producteurs de bovins du Québec.*
Telephone: 450 679-0530 • E-mail: fpbq@upa.qc.ca