GREENHOUSE GAS MITIGATION PROGRAM FOR CANADIAN AGRICULTURE

Dairy Farmers of Canada
Final Report

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Our cows, our air
Nos vaches, notre air
INTRODUCTION

As a result of Canada’s involvement in the Kyoto Protocol and to reduce the impact of climate change, the Government of Canada has launched several initiatives and programs, including some that directly target agriculture. Thus, the Greenhouse Gas Mitigation Program for Canadian Agriculture (GHGMP) was announced in 2002 to tackle greenhouse gas emissions, as part of the Action Plan 2000 on Climate Change. Various industry groups, in partnership with Agriculture and Agri-Food Canada, are delivering this five-year program. The program is designed to create awareness among producers about management practices that reduce greenhouse gas emissions while making economic sense, and also to demonstrate these best management practices (BMPs).

For this awareness-raising and demonstration work in the agricultural industry, AAFC has forged a partnership with national industry groups. The soil Conservation Council of Canada is responsible for the soil and nutrient management sector. The Canadian Cattlemen’s Association, the Canadian Pork Council and the Dairy Farmers of Canada are responsible for the livestock sector. A contribution agreement was signed with livestock industry representatives to provide up to $6,567,931 in federal funds until March 31, 2006 for awareness-raising and demonstration activities.

2003-2004 was more of a planning year, with the set up of the different committees and the elaboration of the various demonstration and communication projects. 2004-2005 benefited from those planning efforts and the implementation of the work plan went smoothly and successfully. 2005-2006 allowed for the collection of useful data that proved to be invaluable arguments supporting the message provided to producers through the numerous communication activities and material.

The demonstration projects are now completed. Those projects were well designed and supervised by GHG experts. Dairy provincial organizations have been working in collaboration with project leaders. The type of demonstrations delivered insured credibility of the message to dairy farmers and provided precious data to the dairy industry regarding greenhouse gas emissions. The communication material and activities created over the last few years have been well received and have proven useful both in raising GHG awareness among the agricultural community and in demonstrating mitigation opportunities.
DEMONSTRATION PROJECTS

The dairy component of the GHGMP, delivered by the Dairy Farmers of Canada and called “Our Cows, Our Air”, carried out four main demonstration projects in various regions across Canada (Atlantic, Québec, Ontario and Western Canada). This ensured good coverage of the different production environments found across the country. These demonstration projects were coordinated by the program’s national coordinator and monitored by a technical committee (researchers and experts) and a steering committee (producers and producers’ representatives). These demonstration projects were part of an overall dairy initiative and were therefore connected, but each had its own specific objectives. DFC also collaborated on another demonstration project carried out in Manitoba, in cooperation with the Canadian Cattlemen’s Association and the Canadian Pork Council.

Since greenhouse gases generated by the dairy industry are primarily related to production efficiency, the first step consisted in promoting production techniques already used by Canadian dairy farmers and in determining how much these practices contributed to the reduction of greenhouse gas emissions. Given that most greenhouse gas emissions related to milk production result from enteric fermentation, nutrition has been the main factor addressed to reduce methane production. The second step, once a sound basis for comparison was established, was to evaluate new technologies for reducing methane production. Some of the meticulously collected data have been used for modeling analyses and have also been of great value to the federal Model Farm program.

Since 1996, Dairy Farmers of Canada has already allocated research funds for greenhouse gas mitigation work. One of the first deliverable was a literature review on the subject, which served as a starting point for the initiation of the current projects under the GHGMP.
1) Atlantic region project

Title: GHG Mitigation in the Dairy Industry, On-farm demonstration (April 1, 2004 to March 31, 2006)

Carried out in cooperation with the Nova Scotia Agricultural College, the Atlantic Dairy and Forage Institute, Dairy Farmers of Nova Scotia, Dairy Farmers of New Brunswick and Dairy Farmers of Prince Edward Island.

Objective: The Atlantic region project sought to demonstrate how methane emissions vary between pasture and confinement feeding. It also looked at which feed supplements (roasted soybeans, candy-factory waste) can potentially reduce methane emissions and improve animal performance.

Demonstration Activities:
A small tracer gas capsule was placed in the cow’s stomach and its breath was sampled using a special halter. Emissions turned out to be similar whether the cows were grazed or silage fed. However, when whole-farm greenhouse gas emissions were considered (effects of emissions from fuel, electricity, fertilizer consumption, etc.), it was determined that grazing can have lower total emissions than silage feeding.

Even if other studies have shown that dietary fats may reduce methane emissions, the effects of feeding cows roasted soybeans remained inconclusive in this study because the cows did not eat the whole quantity offered to them. And while sugar had no notable effect on methane emissions, investigators did note that the sugar-fed cows produced more milk, proving that there is some benefit to feeding cows moderate amounts of waste sugar.

Cows that on average produce more milk produce less methane per unit of milk. The best strategy to reduce emissions, therefore, is to feed cows efficiently and keep them as productive as possible. Good breeding, high forage quality, well managed grazing, and precisely formulated rations are all strategies that not only lower greenhouse gas emissions but improve farm profitability.

Communication and Extension Activities:
- Field day at ADFI Keswick Ridge, launching the NB demo project (April 24, 2004). Over 200 people attended. This activity was well organized and got excellent media coverage (press and TV) before, during and after the event. Major interest showed by local and other producers.
- Project display at the NSAC open house (July 29, 2004) (50 persons)
- Article in Dairy Farmers of Nova Scotia (DFNS) newsletter (July 2004) presenting an Atlantic project summary and invitation to the booth at Agrifest and Kipawo Holstein demo farm open house
- Participation at Agrifest in Canning, NS (August 5-8, 2004) with GHGMP display, extension material and a poster about the local project. Agrifest is a new major agriculture exhibition in the Maritimes that drew more than 10,000 visitors.
- Open house at the demo farm, Kipawo Holsteins, during Agrifest, with poster display and project workers on-site to talk about the program and the project (20 persons)
- Interview on NS Atlantic project for Article in The Adviser
- Article on GHG emissions and dairy farming in Rural Delivery (September 2004)
- Participation at “Open Farm Day” (September 26, 2004) at Kipawo Holsteins, with project manager on site with a poster and materials to present to participants. Open farm day is organized by the Nova Scotia Federation of Agriculture, whereby selected farms across the province hold an open house, for people to visit the farm and learn more about agriculture. (50 persons)
- Project presentation at the New Brunswick Dairy Farmers convention (December 2, 2004)
- ADFI, NB demo farm, tour (December 6, 2004)
- Booth on the project at the Dairy farmers of Nova Scotia Annual Meeting (January 19, 20, 2005) (A farm visit and booth at DFNS annual meeting was cancelled due to storm and power outage in late November)
- Presentation at the Guelph Organic Conference, at a farm scientists symposium on the potential of organic farming to mitigate GHG emissions (January 21, 2005)
- Presentation and poster at the Biocap Conference, Ottawa (February 1-3, 2005)
- Booth at the New Brunswick dairy conference (February 23-24, 2005)
- 2 scientific publications on GHG emission (December-March, 2005)
- Presentation at the NSAC GHG forum (April 2005)
- Project demonstration at NSAC Openhouse (July 2005)
- Presentation at DFC GHGMP forum, Ottawa (February 10, 2006)
- Project presentation at Farmers Taking Charge: Improving farm income and mitigating GHG, Moncton (March 16-17, 2006)
- Booth at Dairy Focus (March 28-30, 2006)

**BMP demonstrated:** improvement of forage fibre quality and digestibility, pasture management and addition of supplements.

**Budget:** 2003/04 - $30,110; 2004/05 - $117,373; 2005/06 - $62,517

**Participating dairy farmers:**
- Herman Mentink (Kipawo Holsteins), Grand Pre, NS
- Wiebe Dykstra, Larry Jewett, Brian Wilson, Malcolm MacDonald, and Bernice Gammon (through ADFI Keswick Ridge), NB

*(Refer to project final report for complete details)*
Figure 1. SF$_6$ measuring technique

Figure 2. Methane production (per unit of milk produced) VS milk production
2) Québec Project

Title: Demonstration project of business-as-usual practices that maintain or increase productivity while reducing CH₄ emissions from dairy herds and manure management system (April 1, 2003 to March 31 2006)

Carried out in cooperation with AAFC-Lennoxville and the Fédération des Producteurs de Lait du Québec.

Objective: The Québec project compared greenhouse gas emissions from cows and manure on dairy farms with different levels of milk production and different herd management practices. The aim was to identify approaches that limit greenhouse gas emissions while maintaining the herd’s productivity. The project also demonstrated the potential of biofiltration in reducing methane emissions from barns and pits on commercial dairy farms.

Demonstration activities:
Two different farms were equipped with instrumentation for monitoring purposes. The air entering and leaving the mechanically ventilated barns is sampled and analyzed on a continuous basis to measure the methane produced by the animals inside. Differences between the two farms include cattle breeds, feed and supplements, the number of daily feedings, and manure management. In both instances, emission peaks correlate with animal feeding schedules.

Each cow produces 350 to 650 litres of methane per day. There are several ways of processing these emissions and reducing their concentrations in air evacuated from barns. Cost and environmental impacts are major factors in deciding which technique to use.

Biofiltration appears to be a promising option. This is a natural process of aerobic degradation of air contaminants through bacterial oxidation. Micro-organisms are attached to a filtering material (such as peat, compost or wood chips) in which contaminants are absorbed and oxidized. The microbes “eat” methane particles, converting them to less harmful carbon dioxide and water.

A large-scale experimental biofilter was designed and built. It is divided into four compartments, each with a different filtering material. The biofilter was set up on a trailer so that it could be moved to different farms, helping to measure its effectiveness in oxidizing different methane sources. Preliminary results show methane reduction of 80% from concentrations of 0.5% to 2.5%.

In addition to the cattle themselves, manure contributes to greenhouse gas emissions. Some systems for storing manure in liquid form create anaerobic conditions that lead to higher methane production, varying according to temperature. Existing data are drawn to some extent from U.S. sources; however, in a cool climate such as in Quebec, volumes of methane produced by
Manure storage in pits may represent less than 3% of the volumes from ruminal fermentation in dairy herds, thus accounting for only a very small portion of a dairy farm's greenhouse gas emissions. Covering manure pits can hold back these emissions while also containing odours and nitrogen, and reducing water accumulation in the pits.

**Communication and extension activities:**
- The first demo farm involved (Ferme Jean-Noël Groleau) has their own agro-tourism museum. This farm has already a lot of visibility and the owners are involved in several organisations. It is the perfect opportunity for extension and awareness promotion. They receive annually over 5,000 to 10,000 visitors. Posters and GHGMP project info have been integrated in the farm tour.
- Two interviews for local paper and TV.
- In searching for new collaborative commercial farms, the project was then presented extensively to 5 other dairy farmers.
- Oral presentation and tour of the project (23 people)
- Oral presentation on the project at the model farm meeting
- Presentation during “La journée de l’Observatoire 2005” at the University of Sherbrooke (50 people)
- Presentation to the “Syndicat des producteurs de lait de l’Estrie” (17 people)
- Presentation at “La journée scientifique et technique en génie agroalimentaire” at the CRDA (Centre de recherche et développement sur les aliments) in St-Hyacinthe (50 people)
- A poster discussing biofiltration to reduce GHG emissions in agriculture was presented during the Livestock Environmental Initiative Conference, Toronto (February 7-8, 2005) (150 attendees)
- Presentation at the 98th Air and Waste Management Association conference and exhibition, Minneapolis (June 20-23, 2006) (30 attendees)
- 2 articles published in the May edition of ‘Le producteur de lait’
- Project presentation and tour to African farmers group (15 people) (Summer of 2005)
- Booth in the “Kyoto platform” of Expo-Champs, St-Liboire (August 30 and September 1, 2005) (7,000 visitors)
- Presentation at The International dairy Federation Summit, Vancouver (September 2005)
- Demonstration Day, Compton (50 people) (December 15, 2005). This was covered and followed by Radio and written press media coverages
- Presentation at DFC-GHG forum, Ottawa (February 10, 2006)
- Article in ‘La Tribune’ (March 2006)
- Presentation at the Model Farm closing meeting, Ottawa (March 1, 2006)
- Presentation at the ISTMM III conference, London (March 8-10, 2006)
- Booth at ‘Le Salon national de la recherché universitaire’, Sherbrooke (March 10-11, 2006)
- Booth at the ‘Conference sur la recherche et l’innovation québécoise en agriculture et en agroalimentaire’, Québec (March 21-22, 2006)
**BMP demonstrated:** identification of current mitigation practices, improvement of production efficiency, negative air pressure cover, biofilters.

**Budget:** 2003/04 - $126,000; 2004/05 - $262,000; 2005/06 - $140,742

**Participating dairy farmers:**
- Sydney Butler, Lennoxville, Qc
- Daniel Clément, Johnville, Qc
- Olivier Jacquet, Martinville, Qc
- Marcel Roy, Cookshire, Qc.
- Jean-Noël Groleau, Compton, Qc

(Refer to project final report for complete details)
Figure 3. Air sampling equipment at barn ventilation points

Figure 4. Typical profile of daily methane emissions of two dairy herds
Figure 5. Large-scale experimental biofilter operating on a covered manure storage tank

Figure 6. Negative air pressure covered manure storage
3) Ontario project

Title: Feeding strategies to minimize the extent of methane output in the environment and improve dairy cow production efficiency (February 1, 2004, to March 31, 2006)

Carried out in cooperation with the University of Guelph and Dairy Farmers of Ontario

Objective: The Ontario project looked at how feeding cows dry-rolled corn and an extract of palm oil (myristic acid) can reduce methane emissions and help Canada meet its obligations under the Kyoto Protocol on climate change.

Demonstration Activities: Dry-rolled corn and myristic acid were incorporated separately into the total mixed rations of the cows’ daily diet. The methane emissions were collected and measured in the breath of the cows with the aid of custom-built head hoods.

Experiments compared steam-flaked and dry-rolled corn to see which produced a higher gaseous output of methane. Dry-rolled corn produced 7% less methane per day per kilogram of milk produced than steam-flaked corn. Myristic acid, meanwhile, did even better, lowering methane emissions by 28% per day per kilogram of milk produced.

Although myristic acid is the clear winner in terms of methane reduction, dry-rolled corn is only a slight change from standard diets. Incorporating dry-rolled corn into the diet is therefore probably the easier and more practical change for producers to make. And dry-rolled corn would benefit not only the health of the cow but the environment as well.

Communication and Extension Activities:
- Article in Ontario Farmer (August 2003)
- Presentation at FarmSmart Livestock Workshop (January 16, 2004)
- Visit of DFC representatives and DFO (December 21, 2004)
- An article on the project was published in The Milk Producer (December 2004). The Milk Producer, a printed magazine, is send to over 10,000 people. Produced by the Dairy Farmers of Ontario, it is the most widely circulated English dairy magazine
- Milk Producer magazine article, (September 2005), approx. 10,000 readers across Canada
- Ontario Dairy Farmer magazine article, (September 2005), approx. 3,000 readers across Canada
- Open day held at Mayhaven Farms, Rockwood, ON (December 14, 2005) (60 people)
- Poster presented during the open house
BMP demonstrated: improvement of grain digestibility, addition of oil.

Budget: 2003/04 - $0; 2004/05 - $118,750$; 2005/06 - $116,250

Participating dairy farmers: Tim May (Mayhaven Farm), Wellington County, ON

(Refer to project final report for complete details)
Figure 7. Custom-built head hood used to collect and measure the cow’s methane emission.

Figure 8. Methane output (L/d per kg of milk)

- Steam flaked corn: 23.9 L/d per kg of milk
- Dry rolled corn: 22.4 L/d per kg of milk
- Control: 41.6 L/d per kg of milk
- Myristic acid: 32.6 L/d per kg of milk
4) Western Canada Project

Title: Demonstration of different alternatives to mitigate methane emissions on commercial dairy farms in Western Canada (case studies) (September 1, 2003 to March 31, 2006)

Carried out in cooperation with AAFC-Lethbridge and Alberta Milk

Objective: This project conducted feeding trials to determine: a) the amount of methane gas produced by commercial dairy farms and b) how diet can be changed to reduce these emissions.

Demonstration Activities:
Methane emissions, which were monitored in the air downwind of dairy barns using laser technology, varied between 438 and 519 liters per day per animal. All cattle over three months of age (with functioning rumens) contributed to this estimate. It was predicted that because of higher feed intake, lactating cows would contribute about 600 liters of methane each day – a significant amount when viewed over the long term.

After monitoring the air entering and leaving a room containing cows, several feeding strategies to reduce methane emissions suggest themselves. For example, the amount of energy lost as methane can be reduced by 20% by feeding cows 3% to 4% more fat from plant sources. This additional fat can come from oil or oilseeds (sunflower seed, crushed canola seed or flaxseed).

Since minimizing loss of feed energy as methane helps to improve efficiency, researchers are still working on different approaches to reduce these emissions through dietary changes.

Communication and Extension Activities:
- Presentation at the Canadian Society of Animal Science, Edmonton (July 2004)
- Oral presentation and a poster at the American Meteorological Society Conference on Agriculture and Forest session (August 2004)
- Presentation at the International Conference of the FAO Escorena Network on recycling of agricultural residues, Spain (October 2004)
- Presentation at Biocap Conference, Ottawa (February 2005)
- Interview with CBC Radio (February 2005)
- Interview with The Western Producer (February 2005)
- Poster presentation at the Western Canadian Dairy Seminar (March 2005)
- Interview with the Lethbridge Herald (April 9, 2005)
- Workshop on GHG and Animal Agriculture and tour of demo farms (April 12, 2005)
- Interview with Farm TV resulting in two documentaries (www.farm.tv) (June 2005)
- Article in the Ontario Milk Farmer magazine (September 2005)
- Two papers presented at the GHG and Animal Agriculture Conference in, Switzerland (September 2005)
- Interview with ABC radio (October 2005)
- Presentation at the Department of Primary Industries, Australia (October 2005)
- Presentation at Australian Greenhouse office, Australia (October 2005)
- Book Chapter in “Greenhouse gas and animal agriculture” (October 2005)
- Presentation at DFC GHG forum, Ottawa (February 2006)
- Poster presentation at the Western Canadian dairy Seminar, Red Deer (March 2006)
- Interview with ABC radio (March 2006)

**BMP demonstrated:** high grain diet, oil supplements, ionophore additives, yeast additives, enzymes, tannins, fumaric acid, oil seeds, saponins.

**Budget:** 2003/04 - $40,000;  2004/05 - $85,000;  2005/06 - $85,000

**Participating dairy farmers:**
- Martin Van Diemen (Van Diemen Dairy Farm), Picture Butte, AB
- Pete Houweling (Houweling Dairy Farm), Coaldale, AB
- George Veurink (Northdale Dairy Farm), Coaldale, AB
- Joop Garretsen (De Linge Dairy Farm), Cranford, AB
- Henry Douves (Douves Dairy Farm), Coaldale, AB
- Nick Sloop (Ridgeview Dairy), Monarch, AB

*(Refer to project final report for complete details)*
Figure 9. The mobile open-path lasers technology

Figure 10. Example of methane emissions associated with three commercial dairies

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<th>Farm</th>
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<td>Herd CH₄ (L/cow/day)</td>
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<td>Percent lactating cows</td>
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<td>Lactating cow CH₄ (L/cow/day)*</td>
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<tr>
<td>Milk Production (kg/cow/day)</td>
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<td>L CH₄ / kg milk</td>
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5) Other Project

Title: Best management practices to improve environmental sustainability and productivity of grassland systems using hog manure (September 1, 2003 to March 31, 2006)

Carried out in collaboration with the Canadian Pork Council (CPC) and the Canadian Cattlemen’s Association (CCA) by the cooperation of the University of Manitoba, Manitoba Cattle Producers Association, Hytek Enterprises, Manitoba Agriculture and Food, Manitoba pork council, Manitoba Milk Producers and Manitoba Forage Council.

Objective: The objective of the project was to establish a site which would serve as an extension centre focusing on environmental sustainability, including strategies for GHG mitigation. A second objective was to bring together commodity groups, University research/extension personal and the agricultural industry to develop a coordinated approach to land management and nutrient utilization. In addition, funds garnered from other agencies were allocated to obtaining estimates of forage yield, forage quality, animal performance and enteric methane emissions, as well as soil nutrient and nitrous oxide measurements. Finally, pathogen profile of the liquid hog manure, cattle manure and potential for organisms to persist in the environment were examined. All the data collected, after tabulation, will serve as a source of extension material during the coming months.

Demonstration Activities:
A demonstration/research site has been established on a 160-acre section of land, owned by Hytek Limited, in the R.M. of La Broquerie. The site includes the following 6 treatments (each replicated twice):
1. No manure and grazing
2. No manure and harvesting hay
3. Split spring and fall application of manure and grazing
4. Split spring and fall application of manure and harvesting hay
5. Spring only application of manure and grazing
6. Spring only application of manure and harvesting hay

The research portion of the project was funded by other organizations. Thus the final results and conclusions could not be included in this final GHGMP report. The GHGMP funds provided for this project were used exclusively for communication/extension activities.

Communication and Extension Activities:
- Article on Pigsite.com (North American newswire), (April 2004)
- Presentation at CSAS Annual Meeting, Edmonton (July 25 2004)
- Field day at site (September 2004)
- Two written articles (The Western Producer and Manitoba Cooperator)
- Two radio interviews
- Student tour at site (September 2004)
- Tour for attendees of the Living with Livestock Conference (October 6, 2004)
  (Handouts related to the project were distributed, Project display set up, Writer from FIW present)
- Media interviews (6) related to the project
- Article about the project written in Farmer’s Independent Weekly Newspaper (June 2004)
- Article written in Manitoba Agriculture, Food and Rural Initiatives (September 2004)
- Submission of book chapter (entitled “Strategies for reducing enteric methane emissions in forage-based beef production systems”) to CSAS (October 2004)
- Article written in Manitoba Forage Council Newsletter (October 2004)
- Student tour (October 2004)
- Presentation at the Manitoba Grazing School (December 2004)
- Presentation to Manitoba Pork Council Research Committee (December 2004)
- Presentation to Hytek Ltd and Provincial Government Officials (December 2004)
- Poster presentation at BIOCAP meeting (February 2005)
- Presentation to Manitoba Soil Science Society Annual Meeting (February 2005)
- Presentation of two posters at the Livestock Environmental Initiative Conference (February 2005)
- Presentation to Seine Rat River Conservation District (February 2005)
- Poster presentation at the Prairie Wetland Greenhouse Symposium (February 2005)
- Presentation at Manitoba Rural Adaptation Council Annual Meeting (March 21, 2005) 75 in attendance
- Presentation to the Board of Directors for the Dairy Farmers of Manitoba (March 23, 2005) 15 in attendance
- Presentation to Manitoba Agriculture Food and Rural Initiatives Staff (April 5, 2005) 10 in attendance
- Tour for members of the Beef Cattle Research Council (June 22, 2005) 2 in attendance
- Presentation to Beef Cattle Research Council (June 23, 2005) 25 in attendance
- Tour for the Manitoba Rural Adaptation Council (July 7, 2005) 55 in attendance
- Presentation – CSAS Annual Meeting (July 26, 2005)
- Manitoba Zero-tillage Research Farm Producer Tour (August 2, 2005)
- Tour for the Stuartburn Piney Agricultural Development Association (August 11, 2005) 85 in attendance
- Prairie Farm Rehabilitation Association Tour (Sept 20, 2005) 30 in attendance
- Agronomy/Soil Society of America – presentation (Nov 6 – 9, 2005)
- Article in the Manitoba Cooperator – Grazing with manure-fed forages could boost land return (Sept. 1 2005) 5,000
- Poster Presentation – Manitoba Institute of Agrologists Tour (Sept. 27, 2005)
- Agronomy/Soil Society of America – presentation (November 2005)
- Faculty Seminar – Faculty of Agricultural and Food Sciences, (Nov. 16, 2005) 60 participants
- Poster presentation – Manitoba Grazing School (Dec. 2005)
- Poster Presentation – Provincial NDP Ministers (Jan. 26, 2006)
- Poster Presentation – Manitoba Pork Council (February 21, 2006)
- Journal article – accepted. Efficacy of ionophores in cattle diets for mitigation of enteric methane emissions. (February 2006)
- Poster Presentation for Hutterite Reception (March 2, 2006)
- Presentation – Integrated Solutions to Manure Management Conference, (March 8, 2006)
- Journal article – accepted. Enteric methane emissions from cattle consuming all-forage diets (March 2006)

**BMP demonstrated:** land management and nutrient utilization

**Budget:** 2003/04 - $12,033; 2004/05 - $7,033; 2005/06 - $7,033

**Participating dairy farmers:**
Hytek Ltd., LaBroquerie, Manitoba

*(Refer to project final report for complete details)*

Figure 11. Field day at Hytek
COMMUNICATION

Disseminating information to Canadian dairy producers was crucial in achieving the program’s objectives: informing producers about greenhouse gas production in agriculture and promoting sound agricultural practices. National communication materials and activities, linked to all the demonstration activities and general GHG matters, have been developed by DFC. The theme for the dairy sector program has been “Our cows, our air”. Provincial dairy organisations hosting demonstrations have been invaluable collaborators who had the ability to reach producers through local communication activities. The national dairy technology transfer officer (Mme Pauline Bilodeau) also assisted in promoting the GHGMP in her technology transfer mandate activities (Dairy Highlights publication, provincial producer annual meeting, etc.).

The GHGMP for the dairy sector attracted over 10,000 persons at 26 demo sites, organised 50 training modules (seminars, workshops, conferences, field days, tours, visits, etc.) and developed 75 communication packages (brochures, posters, signs, articles, videos, booth, websites, sponsorships, etc.). It is also worth mentioning that among all initiatives, particular GHGMP info has been delivered to each of those over 16 000 Canadian dairy farmers on four occasions during the program term, thought DFC Action Plus.

A) “Our cows, Our air” national communication plan

1) Information kit

The introductory information kit, ‘Our Cows, Our Air’, was produced in January 2004 (3,500 copies). It has been broadly distributed as support material for all sorts of communication activities or meetings. It has also been posted on the DFC Web site. An updated version integrating some of the results and conclusions from demo projects was produced in January 2006 (1,000 copies).

2) Articles in Farm Media

Nineteen articles on GHGMP have been published in DFC Action Fax. This weekly newsletter is the main stream communication media used by DFC to reach producers. It is widely circulated, by either email or fax, and it is also posted on DFC’s and some provincial Web sites.

- GHGMP (October 17, 2003)
- GHGMP projects approved! (October 24, 2003)
- GHG Mitigation forum (March 1, 2004)
- Atlantic NB demo project launch (April 30, 2004)
- Presentation of Our cows, our air to the Dairy Caucus (April 30, 2004)
- GHGMP: Nova Scotia Atlantic project. (Invitation to Agrifest and open house at the Kipawo Holstein demo farm). (July 10, 2004)
- GHGMP: Québec project. (August 9, 2004)
- GHGMP: Nova Scotia Atlantic project. (Update on Agrifest and open house at the Kipawo Holstein demo farm). (September 7, 2004)
- Biofiltration and the Reduction of Greenhouse Gases on Dairy Farms. (September 17, 2004)
- Western Canada project. (October 19, 2004)
- GHGMP: Ontario project. (January 21, 2005)
- Special Feature: Information Meeting on GHG and Dairy Production in Alberta (April 29, 2005)
- GHGMP Québec project and Expo-Champs (September 12, 2005)
- Carbon Trading (October 7, 2005)
- UNCCC in Montreal (December 19, 2005)
- GHGMP open house (January 6, 2006)
- GHGMP seminar (February 20, 2006)

Two articles have also been published in DFC Update in April 2004 and April 2005. DFC update is more oriented towards the political community, while DFC Action Fax and Action Plus are targeting Canadian Dairy producers.

Four articles have also been published in DFC Action Plus, a biannually printed magazine, produced by DFC and distributed to every Canadian dairy producers and related partners. GHGMP articles inserted in Fall 2003, Spring 2004, Fall 2005 and Spring 2006 editions.

Two general articles have also been published in The Milk producer, a printed magazine, sent to 10,000 people from the dairy community, in Ontario but also Western Canada and Maritimes. (N.B. other articles on the Ontario and Western Canada project have also been published in this magazine, they are listed in the Ontario and Western Canada project section of this report)

- Kyoto and Cows (August 2003 and September 2003)

One general article has also been published in Le producteur de lait québécois, a printed magazine, sent to 12,300 people from the dairy Francophone community. (N.B. other articles on Quebec project have also been produced for this magazine, they are listed in the Quebec project section of this report)

- GHGMP for Canadian agriculture: Our cows, our air. (April 2004)

One joint article with SCCC, CPC and CCA has been published in Climatimes (October 2003).
3) Backdrop display

The backdrop display developed has being widely used by myself and project teams across the country in various communication events.

- DFC Annual Policy meeting, Ottawa (February 2004)
- DFC GHG forum, Ottawa (February 2004)
- Field day and project launching at ADFI Keswick Ridge (April 24, 2004)
- DFC Annual Meeting in Moncton (July 20-21, 2004)
- Agrifest in Canning, NS (August 5-8, 2004)
- DFC Annual Policy meeting in Ottawa (February 8-10, 2005)
- New Brunswick Dairy Conference in Moncton (February 23-24, 2005)
- Western Canadian Dairy Seminar in Red Deer (March 8-11, 2005)
- DFC Annual meeting in Kelowna (July 12-15, 2005)
- Expo-Champs, St-Liboire (August 30 and September 1, 2005)
- Open day held at Mayhaven Farms, Rockwood, (December 14, 2005)
- Québec project Demonstration Day, Compton (December 15, 2005)
- UNCCC, Montreal (December 2005)
- DFC Annual Policy meeting, Ottawa (February 7-9, 2006)
- DFC GHG forum II, Ottawa (February 10, 2006)
- Western Canadian Dairy Seminar in Red Deer (March 7-10, 2006)
- Dairy Focus (March 28-30, 2006)

4) Signs and posters

GHGMP signs and posters were posted at the various demonstration sites to provide information to visitors on GHGMP and projects.

5) DFC annual meetings

DFC Annual Meetings in Niagara Falls (July 2003), Moncton (July 2004) and Kelowna (July 2005) and DFC Annual Policy meetings in Ottawa (February 2004, 2005 and 2006) were great opportunities to provide visibility for the ‘Our cows, our air’ program to Canadian dairy farmers (approx. 400 participants at each of those conferences). They had a chance to see an update presentation, to visit the GHGMP booth, get information kits, the DFC-GHGMP forum proceedings CDs, and promotion on upcoming program demonstration and extension activities.
6) Conference sponsorships

DFC also used conference sponsorships as a visibility tool for the ‘Our cows, our air’, the dairy component of the GHGMP. Eleven conferences have been sponsored by DFC-GHGMP, ‘Our cows, our air’:

- Forage Focus (October 2003)
- ISTMM III (March 2004)
- Symposium sur les Bovins Laitiers (October 21, 2004) (253 participants)
- Forage Focus conference sponsorship (October 2004)
- Livestock Environmental Initiative Conference (February 7-8, 2005)
- Western Canadian Dairy conference (March 8-11, 2005)
- Expo-Champs (August 2005)
- Symposium sur les Bovins Laitiers (October 2005) (1,187 participants)
- Forage Focus (October 2005)
- ISTMM III Conference (March 2006)
- Western Canadian Dairy conference (March 2006)

7) DFC GHG forums

A first one day GHG forum was organized in February 2004, to give DFC the opportunity to present to its producers and all collaborators in this program, the objectives of the GHGMP in the Dairy sector, the demonstration projects and an overview of what is being done in the other sectors. A CD of the proceedings has been made and distributed to participants. Two hundred and fifty (250) additional copies were also available for distribution as complementary information material. A second GHG forum was held in February 2006, to present the conclusions of the demonstration projects realised within the GHGMP, an update on the carbon trading system and a presentation of a related project on anaerobic digestion funded by the ETAA program. CDs of proceedings were also produced and distributed. Those forums were held following DFC annual meetings in Ottawa, in order to attract Canadian producers leaders. At least 50 people attended each of those events.

8) Other presentations

A presentation of introduction on the GHGMP for the dairy sector was made at the DFC Annual meeting in Niagara Falls (July 2003).

A presentation of ‘Our cows, our air’ program was made to the Dairy Caucus in Ottawa (April 27, 2004), where the demonstration projects used to raise the awareness of dairy producers to the benefits of reducing GHG were explained. It is also important to raise the awareness of all the other stakeholders who work around the dairy industry.
An anaerobic digestion (AD) Course in Cobden, Ontario (September 3, 2004), although not funded under DFC-GHGMP budget, was promoted and advertised via DFC-GHGMP since anaerobic digestion seems to present a promising opportunity to mitigate GHG and presents also other benefits.

Thirty-four people visited Klaesi Farm biodigester installation (February 7, 2005). The tour was held the day prior to DFC Annual Policy Meeting.

A presentation of ‘Our cows, Our air’ was made at a Workshop on GHG and Animal Agriculture, in Lethbridge in April 2005.

A presentation of ‘Our cows, Our air’ was made at the Climate Change Conference on Carbon Trading, in Calgary in November 2005.

A presentation of ‘Our cows, Our air’ was made at the UNCCC conference, in Montreal in December 2005.

A presentation of ‘Our cows, Our air’ was made at the Farmers taking Charge Conference, in Moncton in March 2006.

9) Annual reports

GHGMP Annual reports have also been distributed to Steering, Technical and Local Advisory committee members, DFC board members, provincial associations, project leaders and collaborators. The reports have also been posted on the DFC Web site.

10) Web

A section on the GHGMP has been added to the DFC Web site. The annual reports, the ‘Our cows, Our air’ info kits inserts and additional info can be found there. This new section is also used to promote demonstration and extension activities. On occasion, some provincial associations have also posted some information on local GHGMP related activities on their own Web sites.

B) Local activities

Local communication initiatives achieved in cooperation with program coordinators and project leaders have been listed in their respective project section.

Budget: 2003/04 - $40,000; 2004/05 - $22,627; 2005/06 - $94,535
Figure 12. GHGMP sign at a demonstration farm

Figure 13. Field day at ADFI Keswick Ridge, launching the NB demo project
Figure 14. Our cows, our air booth at the Canadian Western Dairy Seminar, AB

Figure 15. The ‘Agro-museum’ at the Groleau demo farm (QC) provides great communication opportunities for GHGMP
Figure 16. Our cows, Our air info kit

What are greenhouse gases?
Greenhouse gases make life on Earth possible. They form a kind of giant umbrella that blocks a portion of the sun’s heat downwaa. Without these gases, all the heat from the sun would escape back into space, turning the earth unbearably cold. The greenhouse gases produced by agricultural activities are principally carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O).

So what’s the problem?
The problem is too much of a good thing. Over the past 300 years, we have seen the greenhouse gases in our atmosphere increase from 279 parts per million to about 390 parts per million. A few degrees increase in average global temperature may seem small, but the consequences are potentially disastrous.

Is anything being done?
In 1997, 160 countries committed to reduce many countries.

Why should I care?
There is nothing that we can do about it.
Reducing Greenhouse Gas Emissions on Dairy Farms

As producers are well aware, the industry is currently looking at a host of strategies to mitigate greenhouse gas emissions. Some of the ideas below are still on the drawing board while others are being actively studied or tested. The strategies are in three areas: cows, manure and land.

**Cows**
- Improve milk production and feed efficiency;
- Lower the forage-to-grain ratio in the ration;
- Balance and synchronize energy and protein in the ration;
- Improve the quality of forage;
- Process grain to increase digestibility;
- Improve grazing practices.

**Land**
- Reduce tillage intensity;
- Time nutrient application to crop needs;
- Eliminate summer fallow;
- Avoid soil compaction;
- Include more forage in crop rotations;
- Improve production of grazing land;
- Restore permanent grass, woodland or shelterbelts.

**Manure**
- Capture methane in manure storage facilities and combust it, oxidize it with biofilter and recover the biogas and use it as an alternative source of heat or energy on the farm;
- Process manure in anaerobic reactors;
- Keep manure storage tanks cool in summer (below-ground tanks);
- Acidify manure slurry to a pH of 4 or 5.

What’s New at www.dairyfarmers.org

DFC’s website now has the Canadian Quality Milk Program information online at: www.dairyfarmers.org/com. A new section called, “What’s at Stake?” has also been added and has information on the national SM-5’s position on trade for easy access at: www.dairyfarmers.org/engl/industry/4_0.asp.