Canada`s brief Update on R&D activities that address Global Warming presented at the Agricultural Subcommittee Meeting of the Global Methane Initiative. Krakow, Pohland

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Agriculture is a significant source of global greenhouse gas emissions and a major cause of natural resources depletion. According to the FAO report "Livestock Long Shadow" the demand for animal products will double by 2050. Therefore major improvements in production practices must be achieved in order to meet the increasing demand while substantially reducing: the contribution of livestock productions to global warming; and their negative impacts on the natural resources.

The scope and objectives of the Agricultural Subcommittee are to develop an action to address the following types of issues:

- Barriers to project development;
- Assessment of what countries are currently doing related to the sector;
- Identifying opportunities for cooperation and engagement in each area.

Agriculture Canada has been very active in R&D activities to address GHG issue in agriculture and to reduce the negative impact of livestock production on natural resources. It has elaborated several programs to address barriers for best management practices (BMPs) adoption, to develop cost effective BMPs and to encourage national and international collaboration in the area of GHG. In contrary to some countries, Canada R&D focuses on both animal waste management and enteric fermentation. The main reason for this is that enteric fermentation is the most significant source of methane and enteric fermentation and animal wastes management are not independent. For example a change in diet to reduce enteric methane emission might have a positive or negative impact on fugitive methane emission from manure storages, on nitrous oxide emission after land application of manure, or on the bioenergy potential of the manure. Agriculture Canada is encouraging an integrated approach to tackle GHG R&D.

The three mains R&D program going on at AAFC in collaboration with industrial partners are:

1) The Sustainable Agriculture Environmental Systems (SAGES) initiative

Objectives:

- to improve the scientific understanding of agriculture's interaction with the environment;
- to benefit farmers through development and availability of new and improved agricultural practices that address environmental challenges such as climate variability and crop, livestock, and water management in an economically sustainable manner.

- to create a synergy that utilizes partners' expertise to complement AAFC internal expertise to address the issues at stake.

2) AGGP – Agricultural Greenhouse Gases Program

The AGGP represents AAFC's commitment to the Global Research Alliance`s (GRA) efforts to mitigate GHGs worldwide. AGGP will promote environmentally responsible agriculture and support the development of approaches and tools that more effectively and efficiently assist the agriculture sector and its partners in addressing current and emerging agri-environmental issues.

Canada has identified its key interest areas for program activities that will be done in Canada for the benefit of Canadian farmers and other GRA member countries. The AGGP will focus on four priority areas:

a) Livestock systems;
b) Cropping systems;
c) Water Use Efficiency; and,
d) Agroforestry.

Objectives:

- to develop and adopt management practices to mitigate GHGs. Focus is put on both science and knowledge creation and on implementing knowledge and technology transfer. The AGGP will also support the development, verification and validation of new BMPs and new technologies to mitigate GHGs.
- to enhance partnerships, networking and information sharing (domestic and international) to facilitate and coordinate research and technical delivery of BMPs;
- to support project that include scientific research, applied research, demonstration, strategic studies, technical assistance, pilot initiatives, extension and awareness activities related to GHG mitigation information, BMPs and technologies for farmers.
- To promote technology transfer and the adoption of GHG mitigation BMPs and technologies available to farmers

3) Dairy Cluster – Carbon footprint of dairy products (AAFC and Dairy Farmers of Canada joint R&D initiative)

IPCC emission factors are not really applicable to cold region like Canada. Future work on GHG quantification need to be conducted on the entire cycle of GHG from diet formulation, animal metabolisms, excreta storage and application on farm land. The sources of GHG emissions on a dairy operation are interrelated. For example a change in animal diet to reduce enteric methane emission might increase methane emission from manure storage and nitrous oxide from land application, or a practice to reduce ammonia and methane emission from manure storage might increase ammonia and nitrous oxide emission after land application Presently, the impact of diet composition or of the different types of bedding used on dairy farms on the level of ammonia and methane

emission from manure storages or on the level of ammonia and nitrous oxide emission from land apply manure and on the availability of manure nutrients to cereal and forage crops are unknown.

This study uses an integrated approach to obtain more accurate manure methane, ammonia and nitrous oxide emission factors for Canadian farms relative to animal diet, bedding types, storage management and land application practices. The whole project involves a multidisciplinary and multi-national and international organizations team formed of specialists from forage conservation, nutritionist, environmental engineers and soil scientists. The proposed R&D project will establish more precisely the carbon footprint of Canadian dairy products.