TECHNICAL PROTOCOL PLAN

For the Certification of a Greenhouse Gas Protocol and Calculator for the Canadian Dairy Industry

Prepared by

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For

Alberta Environment

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Technical Protocol Plan

Part B
Description of Technical Protocol Plan Content

This section is an overview of the Protocol including: project type, project-specific technology, quantification methodology and how the projects using the protocol will reduce GHGs.

B.1. Description of the Project Type: (The **project type** is a set of project practices or technologies that represent the change from a normal business operation/practices or common industry practice.)
The protocol will support the adoption of projects that might achieve GHG reductions in a number of ways. Currently, the most appropriate feeding and manure management practices for a specific farm may be determined by industry standards, least cost production and/or capitalization of the existing forage harvesting and manure management equipment lineup, etc. This protocol will allow Canadian dairy producers to include potential carbon market revenues when making decisions on management practice changes. GHG emissions will achieved in two ways using this protocol: 1. Reduction in GHG emissions by increasing production efficiencies on the farm such that resources (feed, manure nutrients, electrical and thermal energy) are used more effectively, thus lowering GHG emissions 2. Reductions in GHG emissions by avoiding from emissions from manure storage systems
Description of how real reductions or removals will be achieved: (The Protocol Developer must ensure the GHG(s) that will be reduced by the activities for this project type are within the scope and criteria of the Alberta Offset System.)
All projects are required to take place on Canadian dairy farms. For the purpose of this protocol, a “dairy farm” is any farm which produces milk for eventual retail sale. For this Protocol, a “dairy farm” may conduct other farming practices, such as beef or veal farming, while maintaining its status as a “dairy farm” provided that it continues to produce milk for retail sale. A variety of projects may be undertaken at the farm-level to reduce GHG emissions, while a variety of projects may be undertaken to reduce GHG emissions on dairy farms, the following examples present a number of possible projects and mitigation strategies which may take place under the auspices of the protocol: Examples of the type of management practice changes that will be targeted for GHG reduction quantization with the protocol include, but are not limited to: • Annual milk productivity per cow is increased, thus reducing GHG emissions per unit of milk produced from all SSRs.

- Diet is modified to reduce the proportion of gross energy converted to methane (Y_M)
- Breeding strategies are enhanced and fewer heifers are retained as replacements to reduce emissions derived from replacement animals
- Diet is modified to reduce GHG emissions from the production of feed ingredients
- Pasture use is increased to reduce GHG emissions from manure storage and stored feed production
- Timing of manure spreading is modified to reduce methane emissions from storage unit

Other protocols relating to specific aspects of dairy farm operation are currently available or under development, such as specialized manure handling and/or processing equipment(liquid solid separation, biogas energy production). This Protocol is designed to link and complement relevant protocols to provide additional flexibility and opportunity to mitigate GHG emissions and create GHG reduction credits.

Since the quantification of GHG reduction credits associated with energy efficiency is specialized, the energy use of the farm will not be addressed directly, although energy use is embedded in the emission factors associated with feed production. The Alberta Offset System has an approved quantification protocol for energy efficiency, and an appropriate protocol is in the 'fast track' of Canada's Offset System. Participants in the Dairy Protocol are encouraged to use these protocols dedicated for energy efficiency. As the project activities of the Protocol are expected to decrease emissions per kg of fat corrected milk (FCM), this decision is conservative.

The N_2O emissions associated with the operation of the dairy farms is partly excluded from the Dairy Protocol. Emissions of N_2O for the various types of manure storage are included, and the emissions associated with feed production are embedded in the feed production emission factors. However, emissions from spreading of manure on land are not included. This decision is taken, because the Dairy Protocol does not prescribe the detailed practices necessary to manage N, and because a dedicated protocol for management of N in agricultural soils is under development. The Nitrous Oxide Reduction Protocol will be submitted to the Alberta Offset System, and then to Canada's Offset System. Alternatively, if a GHG program requires the inclusion of N_2O emissions from manure applied to fields, the quantification approach in the Pork Protocol (approved for the Alberta Offset System and submitted to the 'fast track' of Canada's Offset System) could be used with little or no modification. The decision to exclude N_2O emissions from field-applied manure is conservative, because these emissions are expected to be decreased from the baseline scenario under the project conditions.

Other protocols dedicated to quantification of GHG emissions and reductions of specialized aspects of the dairy farm are available in the Alberta Offset System, and are expected in Canada's Offset System. These include protocols to address the use of biofuels, biogas from anaerobic digestion of manure, etc.

If multiple GHG quantification protocols are implemented on the dairy farm, the presence of each project must be declared, the scope of each protocol must be described, and the distribution of credits between the protocols must be documented. Some additional protocols, such as an energy efficiency protocol, may be additive to the Dairy Protocol. However, if a biogas protocol is implemented on the dairy farm, the potential may exist for double counting. The project proponent must demonstrate that the interactions of the different protocols are considered and that integrity is maintained.

B.2. Description of Background Information/Best Practice Guidance Used:

Table 2.1. Good Practice Guidance

1. Document Title	2. Publishing Body/Date	3. Description
ISO 14064-2: Specification with Guidance at the Project Level for Quantification, Monitoring and Reporting of Greenhouse Gas Emission Reductions or Removal Enhancements	**Intergovernmental Panel on Climate Change, United Nations Framework Convention on Climate Change / 2006**	The ISO standard provides the basic framework used by the majority of offset systems worldwide.
WRI/WBCSD GHG Protocol	**World Resources Institute / 2005**	The ISO standard is closely related to the GHG Protocol, which follows the many of the same general principles. The Project Protocol from the WRI/WBCSD is a comprehensive, policy neutral quantification tool for greenhouse gases.
2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry, and Other Land Use	**Intergovernmental Panel on Climate Change, United Nations Framework Convention on Climate Change/ 2006**	This protocol has used IPCC guidance, along with ISO framework, to achieve “accuracy in aggregate”. That is, the quantification of GHG emissions using the Dairy Protocol is not intended to achieve the site-specific predictive capability of a process model. It is understood that the emission coefficients and equations used have underlying uncertainty preventing site-specific

		accuracy. However, using the IPCC guidance and imposing the discipline of the ISO standard ensures the uncertainties of quantification are minimized as the Dairy Protocol is applied over a large number of participating farms.
National Inventory Report	**Government of Canada / 2006**	The National Inventory Report (NIR) of GHG sources and sinks in Canada has been consulted during the development of this protocol. The report, required by the UNFCCC, details sources and sinks in Canada and includes quantification methodologies developed by scientists competent in the respective field of each SSR. The quantification methodologies used in the National Report are base d on IPCC factors modified using Canada-specific data. This Protocol is consistent with the quantification methods as well as data such as coefficients and factors used during quantification. This consistency is assured by involvement in the development of the Protocol and Calculator by the same scientists involved in preparation of the National Inventory Report.
Holos	**AAFC**	Holos is a whole-farm modelling software program that estimates greenhouse gas (GHG)

		emissions based on information entered for individual farms. Holos estimates carbon dioxide, nitrous oxide and methane emissions from enteric fermentation and manure management, cropping systems and energy use. Carbon storage and loss from lineal tree plantings and changes in land use and management are also estimated resulting in a whole-farm GHG estimate. The main purpose of Holos is to envision and test possible ways of reducing GHG emissions from farms.
Pork GHG Project Builder	**Canadian Pork Council/ 2007**	**An ISO based quantification protocol for the Canadian pork industry. The quantification method is a performance based model focussing on animal production efficiencies, manure management methods and some resulting soil and manure storage N2O emissions.**

B.3. Regulatory, Legal Requirements and/or Government Incentive/Grant Programs:

There are currently no legal requirements for Canadian dairy farms to regulate GHG emissions, thus, any GHG emission reduction effort is strictly voluntary. Requirements for manure management, however, do exist in some provinces and such regulations may disallow some Protocol activities for some farms. For example, if application of manure in fall is prohibited by regulation, a participating farm in this jurisdiction may not necessarily generate GHG reduction credits by applying the manure in spring. Protocol participants are required to document that their activities to decrease GHG emissions are not mandated by regulation.

List of potentially relevant climate change incentives:

There are currently no direct climate change programs or incentives for improving production efficiencies in the Canadian diary sector in order to reduce GHG emissions. As increased production efficiency is the driving factor behind the proposed dairy protocol, no incentives are currently available to dairy producers that would apply to activities associated with the proposed protocol.

B.4. Barriers to Implementation:

Few barriers exist that would limit the uptake of technologies and/or management practices that may be identified using the dairy GHG quantification protocol with the potential to reduce GHG emissions.

In many cases, improvements in production efficiency are cost effective in the dairy sector. However, financial issues may pose a barrier to adoption as these improvements may require investment in expensive barn or field equipment. Given the current state of the farm economy and the increasing costs of milk production, payments for ecosystem services such as GHG emission reductions through the carbon market model will likely be required to encourage adoption of practices that result in reduced GHG emissions.

B.5. Review of Technology/Scientific Knowledge:

The dairy protocol does not itself prescribe technologies or management practices which must be implemented to reduce a farm unit GHG emissions, but instead quantifies baseline and project emissions resulting from the implementation of any number of management tools or technologies that may result in GHG emissions.

The following six examples are performance based results of one or a number of implemented BMPs.

- Annual milk productivity per cow is increased, thus reducing GHG emissions per unit of milk produced from all SSRs.
- Diet is modified to reduce the proportion of gross energy converted to methane (Y_M)
- Fewer heifers are retained as replacements to reduce emissions derived from replacement animals
- Diet is modified to reduce GHG emissions from feed production
- Pasture use is increased to reduce GHG emissions from manure storage and feed production
- Timing of manure spreading is modified to reduce methane emissions from storage unit

The following are examples of projects that may be considered by dairy producers to increase production efficiency per unit of FCM in order to reduce the farm unit GHG emissions. This list is not offered as an extensive list of GHG management options for the dairy sector, but as a series of examples for consideration. It will be the responsibility of the individual dairy unit owner to implement those practices that present the most cost effective and practical GHG management option.

Feeding System Management
Increased intensity of forage quality testing to more accurately target appropriate forage harvest dates which result in increased milk production and a reduction in DMI. This effort would result in fewer methane emissions per unit of FCM and lower the farms overall carbon footprint.

Similarly, a dairy production unit may choose to invest in corn planting and harvesting equipment in order to produce corn silage or corncob meal, which generally result in a slight cost of production increase, but more efficient milk production per unit of DMI and therefore, reduced GHG emissions.

A corn kernel processor attachment for the corn silage harvester may also be considered as a GHG project as a processor is an expensive equipment option. The increased availability of the energy contained in corn silage due to kernel processing can decrease methane emissions.

Dairy producers may choose to mix and feed dairy ration more frequently during the day, ie. 3-mixes per day versus 1-TMR mix, in an attempt to maximize the intake of high quality DM for the milking herd. This will require additional labour input and management, but may increase the units of FCM produced per unit of energy and DMI input.

Manure Management
As commonly cited in the pork industry as an opportunity to reduce manure storage system GHG emissions, dairy producers currently applying manure on a once-annual basis may choose to adopt a more frequent manure application schedule to reduce manure storage duration during the warm summer months to decrease methane emissions. This will require additional labour and perhaps equipment purchases in order to apply manure in a tight time window.

Nitrogen Management
A opportunity exists to make much more effective use of legume derived manure nitrogen in the Canadian dairy industry, and greatly reduce the amount of nitrogen fertilizer used in the production of grain, forage and silage crops. Investments in side-banding manure application equipment, allowing for mid-season manure application, may reduce the need for energy intensive fertilizer inputs while reducing soil nitrous oxide emissions. Dairy rations properly balanced in protein may also decrease manure nitrogen excretion and nitrous oxide emissions from the soil rhizosphere.

Energy Management
A number of energy management and efficiency options may be available to a dairy production unit, depending on barn and/or parlour design, age of the facility, etc.

Maximizing the productive photoperiod in the barn (16-hours) may result in increased milk production with a minimal increase in energy required to provide artificial lighting. A number of energy efficient equipment may be applicable options for dairy producers to minimize their use of fossil-based electrical and/or thermal energy. Scroll compressors for bulk tank coolers, variable speed milk and vacuum pumps, bulk tank plate pre-coolers and waste heat recovery on bulk tank compressors are all viable energy efficiency options for operations that have not already adopted these technologies.

B.6. Review of Existing Projects: (Review of trends and statistics on existing practices/projects in the Alberta and/or Canadian context.)

It is difficult to identify any one Canadian or Alberta project as a concrete example of a commercial GHG management project in the dairy sector, as it applies to the protocol described here. It is possible that any or all Canadian dairy farms have made some effort to improve production efficiencies over the past number of years and have also reduced GHG emissions per unit of FCM in the process. It is envisioned that payments for carbon offsets quantified using the proposed protocol will however accelerate efforts to reduce GHG emissions per unit of FCM by making use of previously uneconomical technologies or management practices.

The dairy GHG protocol will not specify specific technologies or management practices but will rather use a performance based standard method of comparing the baseline and project case, and the resulting GHG emissions reductions per unit of FCM for each, while ensuring functional equivalence of the comparison between the baseline and project cases.

B.7. Summary of Quantification Approaches: (Include a summary of GHG quantification approaches and methodologies. At a broad level, not exact formulae and emission factors, but where formulae will come from, activity data and emission factors, ie. Best Practice Guidance.)

Manure Storage Facilities – GHG Emissions

Simple Approach — CH_4 Emissions - Method 1: Annually

The quantification protocol uses a combination of IPCC and CCAR approaches to estimate both baseline and project GHG emissions. These approaches are based on an estimation of volatile solids (VS) loading to the manure storage, and the resulting methane emissions from biological degradation of VS based on local temperatures. The simple approach uses IPCC defaults and a methane conversion factor (MCF) to estimate methane emissions.

Advanced Approach — CH_4 Emissions - Method 2: Monthly

The advanced approach is modelled after the Canadian derived Pork GHG Quantification Protocol approach which uses site specific monthly temperature data to estimate manure carbon conversion rates to methane gas. This is a more accurate method compared to the IPCC Methane Conversion Factor approach, but requires more data collection and management effort.

N_2O Emissions from Manure Storage

N_2O emissions from manure storage are based on IPCC default emissions factors and estimated manure storage nitrogen loading rates.

Cattle – Enteric Methane Emissions

Simple Approach

The simple approach is based on calculations of livestock Net Energy Requirements and the resulting enteric methane emissions that can be expected using IPCC default factors and equations.

Advanced Approach

Methane emissions from enteric fermentation may also be calculated more accurately by measuring the dry matter intake, DMI, on a daily basis using specialized equations built for this purpose. Further, methane emissions from enteric fermentation are estimated using emissions factors modified by Canadian academia specifically for use in teh dairy protocol.

GHG Emissions from Feed Production

Manufactured Feed Production

Using data developed by a team of AAFC staff, embedded GHG emissions for a range of forage, corn and small grain crops have been estimated and are used in the dairy protocol to estimate GHG emissions from feed production.

Pasture Feed Utilization

Pasture based GHG emissions are estimated based on the live weight of pastured animals and default emissions factors.

Feed Transportation

Practices and GHG emissions associated with the transportation of produced feed are not expected to change from baseline to project and, as a result, are not quantified.

B.8. Other Impacts (Optional): (Include other air emissions, odours, risks, environmental impacts on vegetation, wildlife, water resources etc.)

It is envisioned that reductions in ammonia and air emissions may result from the use of this protocol as dairy producers modify animla diets and or manure management systems. A project that targets soil and/or manure storage N_2O emissions may result in reduce soil nitrate leaching.

B.9. Assessment of Baseline Scenarios

a) Evaluate all possible Baseline Approaches in the list below, and identify which ones are appropriate for the Projected Protocol. Justify why each selected Baseline Scenarios is appropriate. Also justify why the other Baseline Scenarios are not appropriate and are excluded from the Protocol.

TABLE 1.2: Assessment of Possible Baseline Scenarios

1. Baseline Options	2. Description	3. Static / Dynamic Baseline	4. Accept or Reject and Justify
Historic Benchmark:	This approach uses site-specific data and records to determine the baseline. The baseline is reviewed and determined at the beginning of the eligibility period.	Static	Accept (primary) – This approach provides the best estimate of real GHG emission reductions wherever reliable historical data is available.
Performance Standard:	This approach, best applied wherever historical records are not available, assumes that the project farm operates	Static	Accept (secondary) – Performance standards provide a comparable baseline wherever project-

	following the typical emissions profile for regional dairy farms.		specific historical information is not available.
Comparison-based:	This approach compares the project farm against a comparable dairy farm which applies business-as-usual practice.	Dynamic	Reject – This approach is not feasible, primarily due to technical and expense difficulties.
Projection-Based:	This approach uses time-series data or models to estimate GHG emission reductions arising from various projects/changes to practices.	Static	Reject – Currently, no proper tools exist to produce GHG projects to the required level of assurance.
Adjusted Baseline:	This approach is more relevant to project relying on specific technologies or practices, whereas the dairy protocol is designed with a greater level of flexibility in identifying GHG reduction approaches.	Dynamic	The historic and dynamic benchmark approaches are the most relevant options for agricultural based protocols, providing accurate GHG emissions estimation and relative ease of monitoring.
Already Registered	This approach uses baseline data from previously registered dairy protocols.	Static	Reject – no similar protocols currently exist.

B.10. Selection of Baseline Scenario: (For the selected baselines scenario(s) from the above analysis, the Protocol Developer must explain why the Baseline approach is static or dynamic, justify the selection of the most appropriate baseline scenario(s) including references and any assumptions.)

Several methods exist for determining a baseline for GHG emission comparison. Different approaches, along with descriptions and their ability to be applied under this protocol, are considered for the development of the Protocol and Calculator.

Based on the consensus of expert judgment in the Protocol and Calculator development process, the Project-Specific Historic Benchmark is selected as the primary approach. This approach requires individual farms to provide data to calculate a baseline for each farm in the project for the year of project registration. The participating experts selected this option, because it most clearly demonstrated additionality or incrementality, and because this approach would most effectively motivate all dairy farmers to continue improvement.

This option is compatible with the requirements of Canada's Offset System, where:

1. The incentive is to use a recent baseline year (A 'non-recent' baseline year can be used, but the Protocol is only valid for eight years after the year of baseline); and
2. Credits may be issued only for credits achieved after 01 January 2008.

However, since the Protocol and Calculator is program-neutral, the Sector-Level Performance Standard is selected as a secondary approach. This approach could work well within the rules of the Alberta Offset System, where many of the approved agricultural protocols use 2001 as a baseline year. Using the secondary approach, the average dairy intensity calculated by Vergé *et al.* (2007) of all dairy farms (1.0 kg CO_2e/kg milk) could be justified as the baseline based on evidence the average intensity is stabilizing. But, the difficulty would need to be acknowledged that farms with better-than-average efficiency could claim GHG credits without incremental improvement and inefficient farms could choose not to participate.

Volume of fat corrected milk has been selected as the standard unit for this protocol because it provides convenience in quantification for the user and convenience in verification for the verifier. FCM is easily measured and understood, as farm quota is issued on an FCM basis.

B.11. Definition of the Project Condition: (Define the project condition and justification for the scope of the activity considered.)

A fundamental requirement of ISO 14064-2 is the quantification of GHG emissions for the baseline scenario and project condition as determined in the protocol, including identification of SSRs relevant to the baseline and project. In the case of the Dairy Protocol, however, the baseline scenario and project condition differ only in the level of GHGs, as influenced by differing management practices, from the same SSRs. Therefore, selection of relevant SSRs for monitoring or estimating in the baseline scenario is the same as in the project condition.

B. 12. Functional Equivalence: (Explain how the project and the baseline are comparable in terms of products and/or activity level. Justify any lack of equivalency.)

Baseline: A key consideration in developing the baseline scenario is to preserve functional equivalence to allow for accurate comparison between project and baseline data. Changes to production that are not a result of project implementation may include:

- Increases or decreases to cattle population; or
- Changes to farm milk production quota.

To ensure functional equivalence of the baseline scenario in this protocol, quantification of emissions is normalized to the basis of kg GHG per kg of FCM. Normalization to this unit will ensure that GHG emissions will reflect the quantity of milk (FCM) produced within the quantification period.

B.13. Flexibility Mechanisms: (Explain optional approaches for quantifying the reductions to be achieved from the project type.)

Other protocols relating to specific aspects of dairy farm operation are currently available or under development. This Protocol is designed to link and complement relevant protocols to provide additional flexibility and opportunity to mitigate GHG emissions and create GHG reduction credits.

Since the quantification of GHG reduction credits associated with energy efficiency is specialized, the energy use of the farm will not be addressed directly, although energy use is embedded in the emission factors associated with feed production. The Alberta Offset System has an approved quantification protocol for energy efficiency, and an appropriate protocol is in the 'fast track' of Canada's Offset System. Participants in the Dairy Protocol are encouraged to use these protocols dedicated for energy efficiency. As the project activities of the Protocol are expected to decrease emissions per kg of FCM, this decision is conservative.

The N_2O emissions associated with the operation of the dairy farms is partly excluded from the Dairy Protocol. Emissions of N_2O for the various types of manure storage are included, and the emissions associated with feed production are embedded in the feed production emission factors. However, emissions from spreading of manure on land are not included. This decision is taken, because the Dairy Protocol does not prescribe the detailed practices necessary to manage N, and because a dedicated protocol for management of N in agricultural soils is under development. The Nitrous Oxide Reduction Protocol will be submitted to the Alberta Offset System, and then to Canada's Offset System. Alternatively, if a GHG program requires the inclusion of N_2O emissions from manure applied to fields, the quantification approach in the Pork Protocol (approved for the Alberta Offset System and submitted to the 'fast track' of Canada's Offset System) could be used with little or no modification. The decision to exclude N_2O emissions from field-applied manure is conservative, because these emissions are expected to be decreased from the baseline scenario under the project conditions.

Other protocols dedicated to quantification of GHG emissions and reductions of specialized aspects of the dairy farm are available in the Alberta Offset System, and are expected in Canada's Offset System. These include protocols to address the use of biofuels, biogas from anaerobic digestion of manure, etc.

If multiple GHG quantification protocols are implemented on the dairy farm, the presence of each project must be declared, the scope of each protocol must be described, and the distribution of credits between the protocols must be documented. Some additional protocols, such as an energy efficiency protocol, may be additive to the Dairy Protocol. However, if a biogas protocol is implemented on the dairy farm, the potential may exist for double counting. The project proponent must demonstrate that the interactions of the different protocols are considered and that integrity is maintained.

Simple and Advanced Options

This protocol provides flexibility for the user by introducing Simple and Advanced approaches to GHG emission quantification from specific sources. At the basic level, the Simple approach for quantification will use an accepted value/emission factor or default assessment of feed quality or GHG emissions while the Advanced approach will require on-site measurement (with proper calibration and QA/QC procedures). Simple and Advanced approaches are not available for all quantifications; wherever flexibility is an option, the requirements and results of each approach will be stated. Protocol participants using the Simple approach will use a discount factor to decrease the number of GHG reductions created. Eligible GHG reductions and discount factors are detailed n the table below.

Because the potential for excess emissions of N_2O due to mismanagement of manure nitrogen, and because sophisticated and comprehensive management of manure N is not prescribed in the Dairy Protocol, users of the Dairy Protocol are encouraged to also enrol in the Nitrous Oxide Emissions Reduction Protocol (NERP). Users who choose to enrol in the NERP will benefit from the reduction credits gained by participating in this forthcoming protocol, and will benefit from an increase in eligible GHG reductions under the Dairy Protocol. To be eligible for "advanced approach" benefits, participants in the Protocol must follow the advanced approach for all quantification calculations which offer such flexibility (no simple approaches may be followed). The discount factor scheme is outlined below.

Eligible GHG Reductions and Discount Factors

Advanced Approaches Only Used in Dairy Protocol	Simple Approaches Used in Dairy Protocol	Enrolment in the NERP	% of GHG Credits to be Received under this Protocol
YES	NO	YES	100
YES	NO	NO	90
NO	YES	YES	90
NO	YES	NO	80

Based on the consensus of expert judgment in the Protocol and Calculator development process, the Project-Specific Historic Benchmark is selected as the primary approach. This approach requires individual farms to provide data to calculate a baseline for each farm in the project for the year of project registration. The participating experts selected this option, because it most clearly demonstrated additionality or incrementality, and because this approach would most effectively motivate all dairy farmers to continue improvement.

This option is compatible with the requirements of Canada's Offset System, where:

1. The incentive is to use a recent baseline year (A 'non-recent' baseline year can be used, but the Protocol is only valid for eight years after the year of baseline); and
2. Credits may be issued only for credits achieved after 01 January 2008.

However, since the Protocol and Calculator is program-neutral, the Sector-Level Performance Standard is selected as a secondary approach. This approach could work well within the rules of the Alberta Offset System, where many of the approved agricultural protocols use 2001 as a baseline year. Using the secondary approach, the average dairy intensity calculated by Vergé *et al.* (2007) of all dairy farms (1.0 kg CO_2e/kg milk) could be justified as the baseline based on evidence the average intensity is stabilizing. But, the difficulty would need to be acknowledged that farms with better-than-average efficiency could claim GHG credits without incremental improvement and inefficient farms could choose not to participate.