

Dairy Farms +

Website: dairyfarmsplus.ca

Factsheet

General description of the tool

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|----------------------------|---|
| Category | Outcome-based |
| Objective | To help dairy farmers understand the benefits of regionalized best management practices and identify the ones that they are or are not yet implementing To allow dairy farmers to benchmark themselves with other producers in Canada and in the province To provide environmental footprint results that farmers can compare with provincial and national averages |
| Geographical applicability | Canada |
| Functionalities | Hotspots identification, alternative scenarios testing, provide a footprint value/metrics |
| Target audience | Farmers |
| Developers | Groupe AGÉCO (with the participation of Dairy Research Cluster, Dairy Farmers of Canada, Agriculture and Agri-Food Canada, Canadian Dairy Network and Canadian Dairy Commission) - latest update: 2016 |
| Format | Online tool (with private access) and possibility to obtain the tool on a USB key |
| Cost (tool and data) | Free for all dairy farmers: access to all of the sections of the tool Free for other users (without a producer number): access to BMP database only (no access to the questionnaire or other sections of the tool) |
| Past or current users | n/a |

Commodities covered

Milk

BMPs covered

Reduced tillage practices
Crop rotation, incorporating perennial or pulse crops

Fertilizer application - source

Application rate based on testing and book values
Application method - conventionally tilled land
Timing of application for plant needs

Use of buffer zones for field crops
Setback distance for manure application in proximity to water bodies
Manage livestock access to water bodies and riparian areas (e.g. provide off-site watering)

Indicators covered

GHG emissions
Land use
Water use

Data

| Data requirements | Primary data required | Default values |
|------------------------------|--|---|
| Environmental conditions | Environmental LCA: province and farm size | Environmental LCA: none BMPs: none |
| Crop management | Environmental LCA: - Feed production: yield (kg/ha wet) BMPs: - (Environmental stewardship: field operations) Soil management, nutrient management, pest management | Environmental LCA for feed production: nutrient and pesticide applied for feed production (type and rate) BMPs: none |
| Carbon sequestration/storage | n/a | n/a |
| Livestock | Environmental LCA: - Manure management: amount of manure applied in total - Livestock: average number of dairy cows (in lactation and dry), dairy cows bought, average distance between the provider and the farm, average number of bred heifers, open heifers, bulls, female calve, male calve, average number of cows and/or calves sold to slaughter - Feed ration: feed composition, amount of each feed consumed by dairy herd with percent purchased BMPs: - (Environmental stewardship: on-farm activities) Feeding strategy - (Environmental stewardship: field operations) Manure storage management | Environmental LCA: none BMPs: none |

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| Energy use | Environmental LCA: - Electricity, gasoline (excluding gasoline for tractors) and natural gas consumption for farm needs BMPs: - (Environmental stewardship: on-farm activities) Energy management | Environmental LCA: none BMPs: none |
| Primary processing | n/a | n/a |
| Water | Environmental LCA: - Optional entries BMPs: - (Environmental stewardship: on-farm activities) Water management | Environmental LCA: water for watering and washing BMPs: none |
| Transport | Environmental LCA: none BMPs: none | Environmental LCA: average distance to the milk processing installation BMPs: none |
| Others | Environmental LCA: - Milk sold in year of assessment, average milk fat content, average milk protein content BMPs: - Worker's well-being: Labour relations, working hours, salary and fringe benefits, occupational health and safety, young workers, integration, work-life balance - Relations with local communities: relationships with neighbours, local involvement, natural and built heritage - Farm management: business planning, regulatory compliance, continuous improvement, networking, participation to voluntary standards - Economic performance: financial management, innovation, risk management, responsible sourcing - Cattle management: animal health and animal welfare - Environmental stewardship: on-farm activities: Biodiversity management, waste management and pollution reduction | Environmental LCA: - average density of milk - average number of days that cows are in lactation - average number of days that heifers are on pasture - average distance between farm and feed suppliers - N, K2O and P2O5 content of the manure - Surface of the corn crop where manure is applied - Fraction of manure handled using a liquid system with or without a natural crust cover, an uncovered anaerobic lagoon, an other solid management system, a solid storage - waste generated BMPs: none |

📍 **Scope** Farm level Supply chain

📍 **Ease of use for the data collector** Environmental LCA: Relatively easy, but may require specific documentation, fairly quick to fill - Qualitative data entries can be easily completed by the user. Quantitative data related to fertilizers and pesticides will require the user to search through its documents, but these documents should be accessible. Data on energy use (electricity and fuel) are usually easily accessible to producers.

BMPs assessment: There are a lot of questions to answers, but the user can decide to focus on only one category of BMPs. Qualitative information is easy to provide.

🔗 Modelling methods

📍 **Consistency of the model with the goal and scope of the tool** Consistent - the tool helps dairy farmers to visualize their environmental impacts and assess their management practices and benchmark them against the average

📍 **Transparency and quality of documentation** Guidance document: Yes - a simple guidance document for the tool will be made
Methodology document: Yes - a methodology document will be made available to users. The LCA study (Quantis et al, 2012) from which the methodology was taken is already available publicly.

📍 **Conformity of the methodology with the current state-of-the-art agronomic and environment sciences** Consistent - the tool is based on a recent study performed in 2012 for the Canadian milk industry, using the well recognized LCA methodology

Methodology

Environmental LCA is based on the International Dairy Federation (IDF) Guidelines (IDF, 2010) on carbon footprints and ISO 14040-14044 standards
- Regional-specific Impact method based on the IMPACT World+ LCIA method (CIRAIG et al., 2012)

BMPs are based on many sources (non exhaustive list) FAO (2013) (Sustainability assessment of food and agriculture systems: Indicators), SAI Platform (2009) (Principles & Practices for Sustainable Dairy Farming), RTRS (2013), Standard for responsible soy production, Quantis et al. (2012) Environmental and Socioeconomic Life Cycle Assessment of Canadian Milk, Canadian Centre for Occupational Health and Safety - Designing an effective PPE program, Alberta Agriculture and Forestry - How to make your own farm first aid kit, CanadaFarmSafe (2011) - Canada Farm Safe Plan, Commission for Labor Cooperation - Guide to On-the-Job Safety and health, OMAFRA - Agricultural Employees, Colombani-Lachapelle (2009). L'organisation du travail en agriculture: un moyen d'améliorer la rentabilité et la qualité de vie sur les fermes, COOP fédérée (2013) - La Gestion durable d'une entreprise agricole, Bélanger (2012). Construction d'un outil d'évaluation de la durabilité des fermes laitières québécoises. Des indicateurs agroenvironnementaux, technico-économiques et sociaux comme outils de diagnostic, MAPAQ - L'équilibre entre travail et famille, ACF - Les comportements des familles agricoles à l'égard de la gestion du stress et de la recherche d'aide

Dataset sources used for modelling

Environmental LCA:
- Feed grown and purchased manure practices, pesticide use, herd size, milk produced, fat and protein content energy consumed, water consumed: surveys sent to farmers
- Diet proportion (%), manure storage practices, fertilizer used in each province, ammonia emissions at farms: literature (Sheppard et al., 2010; 2011)
- Transportation distances for milk, purchased feed sources, manure spreading tendencies: provincial associations
- Provincial crop yields, average crop surfaces per farm, herd size, milk production: Statistics Canada

Outputs / Results

- Results** Detailed summary of results in tables Detailed summary of results in graphs
- Analysis** Summary of main hotspots Comparison with provincial and national averages Action plan with BMPs to be implemented

Limits of the tool/model

Environmental LCA:
- Average emissions for crop production for cow feed may not be representative as there is high variability in the production, management and fertilization
- Potential of soil degradation and use of crop rotation are not well-captured in LCA as data are provided for one year of production only
- Use of average practices for manure spreading and synthetic fertilizers while these are highly variable between farms
- IPCC Tier 2 model for land management does not differentiate between the different types of land management, period of spreading and spreading technique
- The enteric fermentation model does not differentiate between different types of feed
- Methane conversion factor (Y_m) was calculated with Ellis (2007) equation based on dry matter intake, but more accurate models would require information on the chemical composition of the diet which are relevant on a farm-to-farm basis but this information was not available for the LCA study
- Use of generic IPCC value for digestible energy of the diet and no account of the digestible energy decrease when more feed is consumed daily (underestimation of the feed intake of high producing cattle)
- Use of many default IPCC values for the manure management model (not specific to the country or region)
- The model does not represent the fact that the same manure could go through different management systems.