



PROJECT 2013-2018

AGRI-ENVIRONMENTAL ASSESSMENT OF CANADIAN DAIRY FARMS: TOWARDS ECO-EFFICIENT MANAGEMENT OF FORAGE CROPS AND MANURE



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**Number of students trained
(MSc, PhD, Post-Doc):**

8

TOTAL BUDGET

\$787,618

INVESTMENT PARTNERS



Agriculture and
Agri-Food Canada



OBJECTIVE:

This project aimed to adapt the Integrated Farm System Model (IFSM) and the Nutrient Cycling through Crops, Livestock, Environment and Soils (N-CyCLES) Model to the Canadian dairy context, to simulate and predict the impact of specific changes in practices and the net effect on the whole-farm environmental footprint.

KEY OUTCOMES:

- The project improved and adapted two whole-farm models (N-CyCLES and IFSM) to the Canadian dairy context. Upgrades of N-CyCLES and ISFM are significant with respect to improving representation of Canadian production conditions in the models.
- Three model farms were created to represent average dairy farms in the Prairies, Southwestern Québec-Ontario, and Eastern Quebec-Maritimes regions to enable rapid whole farm assessments (animal – manure – soil) of the economic viability and environmental footprints associated with good practices identified during experiments.
- Key findings from field experiments showed that growing alfalfa in a mixture with grasses, instead of pure stands, may increase annual milk production per hectare by 8% in major milk production regions in Canada.
- Sweet sorghum, but not sweet pearl millet, has a good potential as an alternative crop to corn silage for most of the main milk production regions in Canada. However, available hybrids of sweet sorghum could not be harvested at ideal dry matter content under Canadian climate conditions therefore requires development of early-maturing hybrids.
- Applying manure preferentially to fields under perennial forage crops in the fertilization plan will maximize carbon and nitrogen retention in the soil, maximize manure nutrient use efficiency, and may decrease the whole-farm environmental footprint.

LINK TO KTT TOOLS

WEBINAR:

How to Produce and Use Sweet Forages:
[youtube.com/watch?v=V-i5ITk9nJU](https://www.youtube.com/watch?v=V-i5ITk9nJU)

VIDEO:

Applications répétées de lisier de bovin: les impacts sur les stocks d'azote au sol. My Research in 180 Seconds, 2016 DFC Dairy Research Symposium
[youtube.com/watch?v=9ovo-8rJok8](https://www.youtube.com/watch?v=9ovo-8rJok8)

WEB ACCESS TO THE IFSM (V. 4.4):

ars.usda.gov/northeast-area/up-pa/pswmru/docs/ifsm-download-instructions/