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Forage-based indicators of environmental sustainability of dairy farms in eastern Canada

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Introduction On-farm self sufficiency of forage production has been the norm for dairy producers in eastern Canada. This generally meant a relative equilibrium between herd size and land area and a rotation of perennial forages with grain crops used for feed or off-farm sales. Both conditions are generally recognized as sustainable agricultural practices. As farm size increases, either by adding animal units or by cultivating larger land areas, the initial balance is changed; either the land area is insufficient to absorb the surplus of manure or the proportion of perennial forages in crop rotations is substantially reduced. Tools are necessary to evaluate whether such changes affect the environmental sustainability of dairy farms.

Although several methods exist to evaluate the environmental impact of agricultural production, the use of indicators that can be measured on farms to quantify their environmental sustainability is the most appropriate tool to use with producers (van der Werf and Petit 2002). Our objective was to develop indicators to evaluate the environmental sustainability of dairy farms.

Materials and methods This study is a part of a larger project on the environmental, economic and social sustainability of dairy farms in eastern Canada. We used an approach based on the IDEA Indicateurs de Durabilité des Exploitations Agricoles () method developed by Vilain (2001) in France. Indicators were developed through a series of consecutive steps. First, a panel of 25 experts was asked to list all the possible indicators that could be measured on farms to evaluate their environmental sustainability. The potential indicators were compiled and submitted to the same 25 experts who rated them according to their relevance and easiness of on-farm acquisition. The top-rated indicators were brought for discussion in a focus group (12 of the 25 experts) to determine: 1) which indicators should be kept, 2) their minimum (threshold) or target values for a farm to be considered sustainable and 3) their relative weight on a scale of 100 points. Once determined, the indicators were used to assess the environmental sustainability of 40 farms, split between two contrasting agricultural regions of eastern Canada.

Results and Discussion Thirteen indicators were determined and grouped within four components: cropping practices (30 points), fertilizer and manure management (30 points), soil quality (20 points), and farmland management (20 points). The main indicator of cropping practices was perennial forage crops (16 points); the other 14 points were linked to annual crops and comprised four indicators (soil tillage, green manure, crop rotations, integrated pest management). The inclusion of perennial legume and grass species in crop rotations has been known to improve soil structure. The score for forage crops is awarded as a proportion of the total cultivated area in perennial forages; the target value is such that a farm with 80% of its cultivated land in perennial forages gets the full score of 30 points for the cropping practices component. The indicators of the three other components are:

-Fertilizer and manure management: manure storage and manure, nitrogen and phosphorus management;

-Soil quality: soil organic matter, soil phosphorous saturation;

-Farmland management: water course protection, land drainage, windbreaks, field slope, on-farm woodlot.

Some of these indicators are completely independent of forage production but others like soil organic matter or nitrogen management (forage legumes) are often a consequence of the proportion of perennial forage crops in the rotations.

Conclusions In eastern Canada, a panel of 25 experts determined that the environmental sustainability score of dairy farms was largely dependent on the inclusion of perennial forages in their crop rotation. Dairy farms that expanded their cultivated land without increasing their herd size usually opted for more grain crops, decreasing the proportion of perennial forage crops in their rotation. While such a decision could be positive for the economic sustainability of these farms, they may face a bigger challenge in terms of environmental sustainability.

References

- van der Werf, H. M. G. and Petit J. 2002. Evaluation of the environmental impact of agriculture at the farm level: a comparison and analysis of 12 indicators-based methods. *Agriculture, Ecosystems and Environment* 192, 1-15.
- Vilain J. 2001. La méthode IDEA indicateurs de durabilité des exploitations agricoles. Guide d'utilisation. Educagri Editions. Dijon, France. 151 p.