Agricultural Approaches to Mitigation of Risks to Drinking Water

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Prescribed Threats from Agriculture

- Nutrients – manure(storage, handling and application) mineral fertilizer (storage, handling and application
- Pesticides (storage, handling and application)
- Bacteria (manure application, grazing)
- Fuel (storage, handling)

Nutrient Risk Mitigation Process

- Nutrients – nutrient management planning and implementation (Strategies and Plans)
- Strategies and Plans are reviewed and approved by the experts in the Nutrient Management Branch of OMAFRA
- At present it is applied to all farms over 300 nutrient units and those that since 2004 are new or have expanded (required a building permit)
- At present the monitoring is done on a random audit basis with 200 farms per year being audited as well as farms where there have been complaints or violations
- In the last annual report of auditing the average compliance score was in excess of a 75 % grade with the bulk of the issues being related to record keeping and a few issues with buffer widths
- Based on best available science

Basic Approach

- Input - Output = Base Storage + Change in Storage

  Input = manure + mineral fertilizer + fixed nitrogen

  Output = crop removal + volitzation+ losses

  Change in storage approximately 0

  Base Storage is the minimum amount of Nutrient that can be managed by the farmer for out climate region to ensure that losses due to erosion and leaching are minimized. It is based on the best available science for our region.

Nutrient Balance

Characteristics of Farms Based on Manure Nutrient Balance

Manure Nutrient Balance	Deficit	Balanced	Excess
Animal Density*	Low (<1.25 AU/A)	Medium (1.25-2.25 AU/A)	High (>2.25 AU/A)
Feed Source (% Off Farm)	<50%	50-80%	>80%
Land for Manure Application	Adequate	Limited	Inadequate
Manure Management Strategy	Deficit Balance Strategies	Nutrient Balance Strategies	Excess Nutrient Strategies
Economics of Nutrient Management	Positive	Neutral	Negative
Non-point Source Pollution Potential	Low	Low to High	High

AU = 1000 lb live weight/acre for 365 days, source USDA

Functions of Nutrient Management

1. Nutrient management is precautionary and does not allow the operation to be in excess (land base must be adequate to achieve the balance of application versus crop removal
2. It requires control on rates and timing of application to reduce losses due to adverse events (as far as is possible)
3. It requires control on the integrity and volume of storage as well as handling practices
4. It deals with many of the issues related to management of bacteria
5. It provides for environmental protection for wells and for surface water bodies through setbacks
6. It provides for runoff control in requirements for ponds and grassed waterways
7. The check on the balance is the soil test to determine if the balance is being maintained

The Nutrient Risk Management Program

- Plans are developed based on either the use of an expert licensed Nutrient Management Planner or through the use of the guidance documents and the NMAN software for estimation of balances and design requirements
- Plans and strategies are reviewed and approved by OMAFRA experts
- Plans are monitored by MOE auditing and investigations Branch
- Monitored though monitoring and documentation of activities, and residual nutrient levels in the soil
- Plan reports are required within 60 days of the end of the cropping season
- Plans are renewed every five years or when major changes are made in the nutrients used on the farm.

Links to Clean Water Act Implementation

- The existing system is based on best available science
- It is overseen by expert reviewers and audited by expert auditors
- The act is under the jurisdiction of the Minister of the Environment with support from OMAFRA
- The act is structured in a similar fashion to the Clean Water Act in that it is precautionary in nature
- Acceptance levels are high
- Compliance levels are high
- Needs to be expanded to include all farms that are identified as significant threats
- Needs to be available to those no significant threat farms that seek voluntary compliance
- Funding can be augmented from the EFP program and the Ontario Farm Stewardship funding
- Limits costs to municipalities

Pesticide Risk Management

- Currently managed under the Pesticides act
- All farmers who purchase pesticides must have a pesticides applicators permit
- This is based on having passed an examination under the pesticides applicators training and certification process.
- The training covers a wide range of applications purposes and is specialized for agricultural pesticides and their use
- The training covers handling and application of pesticides, the health and safety aspects of management of pesticides, current legislation and regulation, and environmental protection
- The farmers must account for the pesticides they have purchased.
- There return and disposal of unused pesticides and pesticide containers is governed by O.Reg 63/09 and Regulation 347 under the Environmental Protection Act
- Farm organizations are working with vendors of both pesticides as well as animal medicines to collect and safely dispose of unused materials, with drop off and disposal stations being located around the province and

Bacterial Management

- Much of what is contained in Nutrient Management provides for the minimization of the movement of bacteria from farm operation.
- Nutrient Management plans include best practices for the storage, handling and application of manure to reduce bacterial contamination
- OMAFRA is currently researching improved storage management for bacterial control
- The development of vaccines to eliminate pathogenic bacteria from animals that can impact human health is well underway and a vaccine for E.coli. H01757 in cattle is already available and is being promoted in Ontario
- OFEC is currently compiling the best available science for review and incorporation in our best practices manuals as well as for updating nutrient management process

Fuel Risk Management

- The majority of farms do not have storage greater than 2500 L
- The majority of tanks are owned and maintained by fuel suppliers in accordance with TSSA rules
- The storage of fuel is governed by the TSSA some of these include :

  - ULC approved tanks and equipment and installation of equipment by a licensed technician

  - setbacks from wells (dug or bored 100ft and drilled 50 ft) and buildings (15 ft)

  - secondary containment for tanks over 5000 L (liquid tight barriers that can contain 110 % of the contents of the tank)

  - barriers to prevent collision by equipment with the tank

  - automatic shutoff nozzles for non manual, pumps and siphon protection for manual pumps
- Significant information on handling and management of fuel is contained in our BMP manual on Water Management and is part of the EFP training provided to farmers

Non Regulatory Environmental Management

- Environmental Farm Plan
- Canada Ontario Farm Stewardship Program
- Livestock Medicines Education Program
- ALUS (Alternative Land Use Services Projects)
- Rural Clean Water Programs
- Ontario soil and Crop Improvement Association Programs
- Municipal funded Rural Clean Water Programs (linked to EFP)
- Clean Up Rural Beaches (in the past)
- Land stewardship (in the past)

Environmental Farm Plan

- A risk assessment and management process for environmental protection sustainable production, and health and safety
- 34,000 out of 57,000 farm families in Ontario have participated to 2009
- 300,000 person days of training in environmental management
- Governments have spent nearly 300 million farmers have spent nearly 800 million over the past 17 years to improve the farm environment on a volunteer partnership basis
- The program in various forms has been adopted across Canada
- A similar program has been developed for non farm rural land holders at the through the University of Guelph (The Rural Landowners Stewardship Guide)

Work Sheets

- Infosheet # 2 - Water Wells
- Infosheet # 3 - Pesticide Handling and Storage
- Infosheet # 4 - Fertilizer Handling and Storage
- Infosheet # 5 - Storage of Petroleum Products
- Infosheet # 6 - Disposal of Farm Wastes
- Infosheet # 7 - Treatment of Household Waste
- Infosheet # 8 - On-Farm Storage of Livestock Manure and Other Prescribed Materials
- Infosheet # 9 - Livestock Yards and Outdoor Confinement Areas (OCAs)
- Infosheet # 10 - Silage Storage
- Infosheet # 11 - Milking Centre Washwater
- Infosheet # 12 - Nuisances under the *Farming and Food Production Protection Act, 1998*
- Infosheet # 13 - Water Efficiency
- Infosheet # 14 - Energy Efficiency
- Infosheet # 15 - Soil Management
- Infosheet # 16 - Nutrient Management in Growing Crops
- Infosheet # 17 - Manure Use and Management
- Infosheet # 18 - Horticultural Production
- Infosheet # 19 - Field Crop Management
- Infosheet # 20 - Pest Management
- Infosheet # 21 - Stream, Ditch and Floodplain Management
- Infosheet # 22 - Wetlands and Wildlife Ponds
- Infosheet # 23 - Woodlands and Wildlife

Top 10 BMPs for past 2 Years

BMP #	BMP	# of projects	Government funding
27	Renewable energy	199	$975,540
5 *	Runoff control	139	$943,313
14*	improved tillage and land management	138	$730,605
10*	Buffer strips and habitat	165	$606,964
13*	Precision use of fertilizer and pesticide	150	$564,748
8*	Fuel and Pesticide Storage	89	$394,627
26	Energy conservation	95	$300,065
19*	Shelterbelts and native vegetation	95	$265,468
16*	Improved Management	117	$261,717
9*	Water well upgrade and protection	137	$238,748

* Water protection related

Source OSCIA

Improved Land Management

Ontario

Table 1.11
Agriculture overview, Canada and the provinces - Soil conservation practices and land features, census years 2006 and 2001

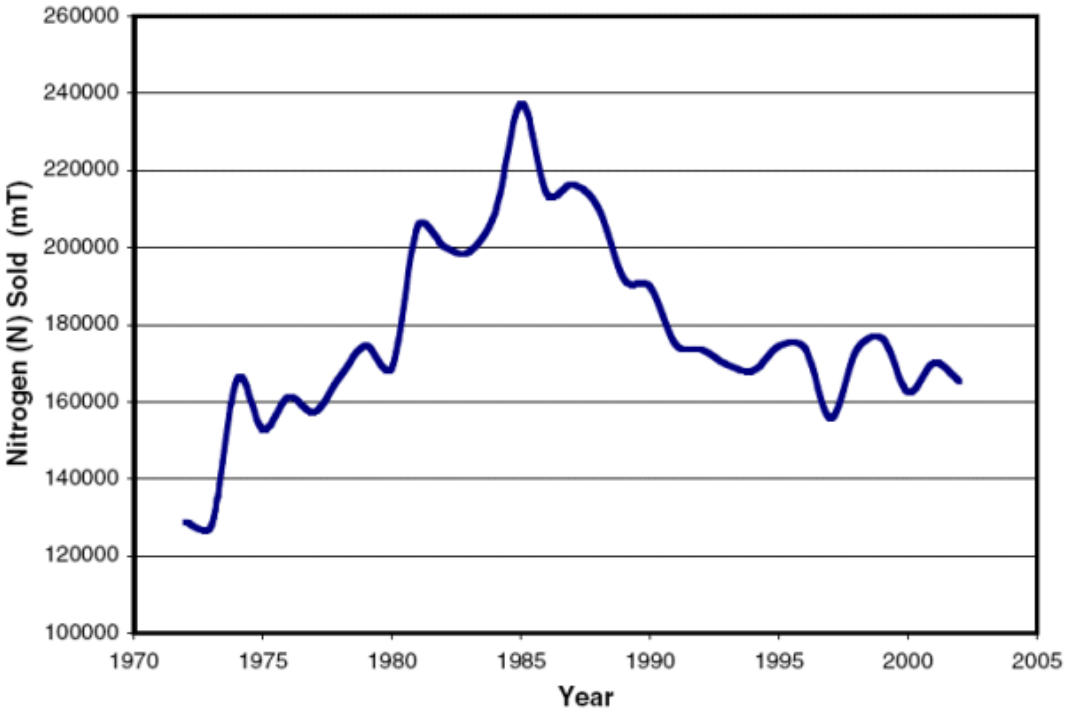
Ontario	Soil conservation practices and land features	
	2006	2001
Ontario	farms reporting	
Total farms	57,211	59,728
Crop rotation	38,398	39,040
Winter cover crops	8,585	5,751
Plowing down green crops[1]	11,559	7,288
Rotational grazing[2]	15,034	..
Windbreaks or shelterbelts[1]	19,044	8,132
Buffer zones around water bodies[2]	14,272	..

Source: Statistics Canada

Agriculture's Record of Performance

- Reduction of soil erosion and nutrient losses through the adoption of reduced tillage (24 % of farms maximize the retention of crop residue, 31 % of farms use no-tile) and use of cover crops
- Agriculture has reduced fertilizer since the mid 80s
- 50 % reduction in the use of pesticides over the past 30 years
- The majority of livestock nutrient units in Ontario are now under nutrient management

Fertilizer Use in Ontario



Source: statistics Canada

Questions