

Supermarket Tour Manual – Industrialization of Farming in Canada

Includes:
Final Report

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The Industrialization of Farming

This chapter will outline many aspects of farming that have been influenced by the industrialization of agricultural practices.

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Introduction

What is the Industrialization of Farming?

The industrialization of farming refers to the transformation whereby farms have become larger-scale, declined in number, and integrated more directly into production and marketing relationships with processors through vertical integration. As with non-farm firms, industrialized farms have a division of labour among owners, managers, and labour with different groups of people assigned to different positions in the production process (Lobao, 2000).

Agriculture Then and Now

- In past decades most Canadian families lived in rural areas and a large portion lived on farms. Farm work was done mainly by hand or with simple tools and the farmers provided food for their families and their communities.

Fast Facts

- ❖ In 1931, 1 in 3 Canadians lived on farms. By 2001, that number was reduced to 1 in 40.
- ❖ 50% of Canada's farmers have had to take off-farm jobs.
- ❖ Average age of Canadian farmers is 51 years old.

Kissock, 2007

- In 2001, about 727,000 Canadians lived on farms, making up 12% of the rural population and just 2% of the overall population. Today most work is done with machinery and farming is a job for the select few who can make a go of it.
- These facts show that farming in Canada has drastically changed over the past decades from several, small family farms (farm household owns and controls the majority of farm production, land, labour, capital, technology, and management) to large, mechanized businesses (non-household based production unit, with absentee ownership and control over production factors).
- Public concern about the consequences of non-family owned and operated, industrialized farms in communities are growing as each industrialized farm inaugurates. These concerns have been raised about industrialized farms because of the many detrimental impacts. As the number of farms declines, production becomes concentrated on larger farms. Some of the negative impacts are the depletion of water and other energy resources, soil erosion, odour issues, decrease in population due to lack of jobs, decrease in other businesses, and the health and everyday living of people residing in the places where these farms are located.
- These problems can extend to national food system issues, such as agribusiness concentration, consumer health, food safety, and sustainability of the national eco-system.

Implications for Farmers

- Economic pressures have driven farmers out of business and fewer, larger farms have taken over. Canada has roughly the same amount of land as it did 50 years ago but fewer farms. The average size of a farm was 96 hectares in 1941 and by 2001 it was 273 hectares. Lower profits have pushed farmers to be more competitive therefore making farmers adopt more advanced techniques and strategies to increase overall productivity.

“There were half as many dairy cows in 2001 but the herd produced 10.6% more milk than in 1976.”

- Farmland has increased in price over the years, from \$17 an acre in 1941 to \$3000-\$5000 today depending on the area and if it's in prime farmland.

The number of poultry farms declined from nearly 8,700 in 1981 to just over 4,900 in 2001. However, the number of birds reported on these farms rose from 89.1 million in 1981 to 123.6 million in 2001.

- This data shows that industrial farms are producing larger amounts of birds per farm with fewer farms. This practice is beneficial for the economic part of the industry but with a larger volume of birds in one barn they are more susceptible to disease and illness. An outbreak of an illness on one farm will have a larger impact on an industrial farm than it would if we had more, smaller farms.

Fewer Farms Mean Fewer Farmers

- Individuals who are farming tend to be older. The average age of a Canadian farmer in 2001 was 49. A lack of younger workers entering farming may cause labour shortages in the future.
- The reduction in farms has had a negative impact on other aspects of the economy as well as the livelihood of others. For example, hardware stores see a decline in business because they are not selling materials to the farmer who has the small and moderate size farms. Individuals who worked at grain elevators are losing their jobs because the elevators are closing, tractor dealerships go out of business because they are only selling to one or two farms. If industrialized farms take over this will decrease the amount of small farms which may put other small businesses out of business.
- Over the past fifty years our population has almost doubled and the amount of people living in urban areas has increased significantly.

- ❑ *Population in 1961 – 18.2 million*
- ❑ *Population in 2001 – 30.0 million*

- Most of this growth has occurred on agricultural land. Urban growth raises the price of farmland and farmers are unable to afford the cost of land therefore making it more likely that the land will be sold to developers.

If Ontario loses their agriculture land, prime fruit-producing areas will be lost. Fruit-trees and vineyards require specific microclimates to thrive, the loss of these lands could mean a permanent loss of our capacity to cultivate these crops.

Statistics Canada, 2006

- If Ontario loses prime agriculture land all of our fruit will need to be shipped into Canada from other countries. This means that the cost of buying the fruit will be more expensive, the fruits will have less freshness as local or Ontario fruit, and there will be negative effects on the environment from the transportation and packaging.

What are the Advantages and Disadvantages of Industrial Farming?

The major challenges and issues faced by society concerning industrial agriculture include:

Advantages:

- Cheap and plentiful food
- Convenience for the consumer
- The contribution to our economy on many levels, from growers to harvesters to processors to sellers

Disadvantages:

- Environmental and social costs
- Damage to fisheries, due to surface and groundwater pollution from animal waste and fertilizer use
- Increased health risks from pesticides
- Increased ozone pollution and global warming from heavy use of fossil fuels

Source: Wikipedia, 2007

Farm Accidents and Health of Farmers

Work-related accidents are common in farming; the tractor is a central factor in farm accidents but other machines such as grain augers, balers, combines and power shafts can be too. It is estimated **150 to 200 people die** from farm-related accidents each year in Canada.

Data from Canada's 2001 Census of Agriculture was used to identify factors that influence the probability that a farmer will suffer non-fatal injuries from farm activities. The data shows that men under 55 years of age who are the primary operator of the farm and who work fewer than 40 hours per week on the farm are more likely than others to sustain an injury. Note: The chance of sustaining an injury increases on beef cattle farms and areas under cultivation.

**More injuries are reported on crop-oriented farms and beef-cattle farms because of the use of heavy machinery and intense industrial practices. The farming population is aging at a rapid pace and the labour intensive practices are becoming too difficult for the aging farmer's body.*

Agricultural practices are ranked as the fourth most dangerous occupation. There are eight factors that contribute to injuries on the farm.

1. Age
2. Sex
3. Size of Farm
4. Off-farm Work
5. Hours Spend Working
6. Operator's Rank
7. Farm Type
8. Time spend on Farm (Labour)

Source: Statistics Canada, Census of Agriculture, 2001.

Agricultural injuries reported by farm operators, Canada, 2001

Type of injury	Number of injuries
Multiple injuries	386 4.01
Fractures	1,991 20.70
Dislocations	242 2.52
Sprains and strains	1,359 14.13
Open wounds	1,903 19.79
Crush injury	527 5.48
Foreign body in ear, eye, nose or mouth	361 3.75
Head injuries	138 1.43
Burns	110 1.14
Internal injuries	39 0.41
Back injuries	1,403 14.59
Poisonings	81 0.84

Physical condition unrelated to trauma	453 4.71
Other injuries	624 6.49
Total	9,617 100.00

Source: Statistics Canada, Census of Agriculture, 2001.

**Some health concerns are common to most farmers, farm families and farm labourers.
What are some of these Hazards?**

- Health hazards from use of chemicals (pesticides, insecticides, fertilizers)
- Dangerous machinery, infectious diseases, noise, and stress
- Exposure to farming chemicals may lead to greater risks of certain cancers (e.g., cancer of the stomach, testes, and brain)
- Chemicals have also been implicated in neurological diseases, skin disorders, and reproductive health problems in both men and women (e.g., disrupted sperm production, menstrual irregularity, spontaneous abortion, stillbirth, neonatal death, infant mortality and congenital anomalies)
- People on farms often suffer from lung disease(e.g., "farmer's lung" from exposure to moldy hay, "silo filler's" lung from exposure to oxides of nitrogen from unventilated silos, and asthma)
- Infectious diseases (e.g., leptospirosis, salmonella, brucellosis, tularaemia, Q fever, ornithosis, toxoplasmosis) carried by several animals
- Hearing loss due to noisy machinery

Source: Jennissen, 1992

Seasonal Agricultural Workers

- Every year Canada becomes a temporary home for over 18 000 migrant works, mostly from Mexico and the Caribbean.
- Most workers are men but women also participate. Married men and single mothers are typically recruited into the program as they feel the need to provide for their families.
- Through the 'Seasonal Agricultural Workers Program' these workers are recruited to work in Canadian fields for up to eight months without the opportunity to become citizens.
- With the intensification of agriculture, farmers can no longer simply rely on their friends and neighbours help. The lack of local labour force is also linked to industrialized farmings factory like set up. Jobs are often monotonous and repetitive, making them undesirable to the locals.
- Canadian government and the agriculture industry have relied on this program to fill shortages in agricultural labour.

Sectors that Typically Use Seasonal Workers

- Apiary (Honey)
- Tobacco
- Canning/Food Processing
- Nurseries
- Vegetable farms
- Greenhouse Vegetables
- Fruit farm (esp. apples)
- Flower/sod farms

- Many of these workers are exploited and forced to work 12 hour days, 7 days a week for less than minimum wage in dangerous conditions. Workers often avoid complaining about wages, hours and conditions out of fear of being deported and not finding a position in the following seasons.
- Employers find it easier to send workers home, at their own expense, rather than deal with their serious concerns. As soon as their contract is up, workers are sent home. However, many of these workers return year after year in order to provide for their families.
- Once they return to their home country, they are required to complete an evaluation of their employers. Most workers tend to provide neutral feedback, inspite of poor working conditions and poor treatment, because, again, they fear that negative input will result in them not returning to Canada in following years.

The main issues faced by Seasonal Agricultural Workers include:

- 12-15 hr days, without overtime or holiday pay
- Application of dangerous chemicals/pesticides without any safety equipment or training
- substandard housing
- paycheck deductions for services (such as EI) to which they have little or no access
- Inadequate health services
- Forbidden from collective bargaining and unions
- Not allowed to claim residency or obtain educational opportunities for children regardless of extensive years working in Canada, lack of basic training

Source: <http://www.justicia4migrantworkers.org/saw.htm>

When you purchase your food at large supermarkets you are not told what kind of working conditions the workers who helped plant or harvest, or even if they were paid a fair wage

Hothouse Production

- Canada has a short summer and long winter, which limits how much we can grow in our fields. However, with the introduction of greenhouses, we are now able to grow vegetables year round.
- You would think this could help us to grow more food locally, therefore being more environmentally friendly, and provide food security, but since many of the greenhouse products are grown for export to other countries, they actually decrease food security and create a large distance between place of origin and place of consumption.
- Almost all greenhouses use some form of hydroponics, a methods of growing vegetables that involves nutrient rich water rather than soil. The nutrient enrich water relies on artificial nutrients and there is therefore no organic way to produce fruits/vegetables in a greenhouse
- Greenhouse vegetables are typically priced higher than the field grown variety due to higher production costs form higher fuel usage, labour and high use of technologies.

Fuel cost for tomato greenhouses increased by 44 percent between 1996 and 2000.

Estimated Fuel cost

Year	\$ million
1996	\$79
1997	\$97
1998	\$98
1999	\$110
2000	\$159

Source: <http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1188310981709&lang=e>

- Greenhouse production: is concentrate in Ontario, B.C and Québec due to climate and proximity to US markets, but it occurs in all provinces to some degree.
- Greenhouses allow year round production and high yield but at what cost? Since most greenhouses rely on hydroponics to grow their products, they are heavily dependant on the mass usage of water.
- Greenhouses have a high dependency on non renewable energy in oder to maintain a proper growing temperature through out the colder seasons.
- With declining water supplies, is this practice really sustainable? Also, many of the greenhouses rely on migrant workers who, with their low wages, help to offset the cost of production, but is this really ethical?

Decline in Crop Biodiversity

Case Study: The Complete Industrialization of Farming: Weeding Out the Skilled Farmer by: Jim Scharplaz

Last summer, a field by my house was planted to soybeans. Walking past early in the growing season, I noticed that the field was completely free of weeds. The plant population had been reduced to the simplest possible—only soybeans grew there. These were genetically modified to resist the well-known herbicide with which the field had been treated. The herbicide had killed all other plants.

Genetically modified plants and modern herbicides are among many new technologies for farming. Some people are concerned about these technologies' effects on human health. Others worry about the environment. I am concerned that the main purpose of these technologies is the complete industrialization of agriculture. This does not bode well for farmers or the rest of us.

Source: Scharplaz, 2003

What are the affects to the environment when crop biodiversity is minimal or non-existent?

- loss of species, endangered species
- decrease in immunity to pests and disease
- loss of native habitat, we have less than 13% of shortgrass prairie, 19% of mixed-grass prairie, 16% of aspen parkland, and almost none of the tallgrass prairie remaining in their native state
- soil lose
- reduced water quality

Fertilizers

Fertilizers are any material, natural or manufactured, which may be added to the soil to supply plant nutrients. Fertilizers that are most commonly used for plant growth are nitrogen (N), phosphorus (P₂O₅) and potassium.

- The use of manufactured fertilizers is unavoidable in agricultural systems. They are beneficial to the health and growth of the crops
- Where fertilizers are available at prices that farmers can afford, crop yields are much higher than in countries where very little fertilizer is used
- In Canada the highest rates of fertilizer application are in eastern Canada; the lowest in the prairies
- It cost \$110 to fertilize one acre of corn, before planting (The Canadian Encyclopedia, 2007).

A Canadian Case Study: Lake Erie

The Great Lakes ecosystem was affected greatly, as waves of immigrants logged, farmed and fished commercially in the region. In the mid 1900s, the combination of synthetic fertilizers, existing sources of nutrient-rich organic pollutants, such as untreated human wastes from cities, and phosphate detergents caused an acceleration of biological production in the lakes. In the 1950s, Lake Erie developed massive algae blooms and an area of depleted oxygen in the Central Basin of the lake, a "dead zone," where levels of oxygen in the bottom waters were too low for

fish and other organisms to stay alive. The lake returned to normal in the 1980's and the levels of phosphorus are stable.

Source: United States Protection Agency, 2007

Pesticides

More than **400** pesticides are now registered for use in Canada; they can be used in these forms: liquids, dusts, powders, aerosols and granules. Pesticides are used more increasingly in industrial farming because of crop monocultures and the risk of pests and disease devastating entire fields.

History: Pesticides include a wide range of synthetic and natural substances. Relatively few pesticides existed before WWII: insecticides were primarily salts of arsenic, or fluorine or plant-derived products such as nicotine, herbicides included petroleum oils, sulphuric acid, some arsenites and salt. After WWII, many synthetic compounds became available, the first of these being DDT for insect control, and phenoxy herbicides for weed control (The Canadian Encyclopedia, 2007).

Impacts:

- **Chemical Soup:** There are thousands of chemicals in our air, water, dust, and food coming from everyday products like industrial pesticides, detergents, cookware, cosmetics, paints, sofas, shower curtains, computers, and TVs. These chemicals accumulate in our bodies-in our fat, blood, and organs and stay there for a long time.
- Pesticides now differ widely in their toxicity to different forms of life. The term LD50, used to indicate lethal toxicity, refers to the dosage of the pesticide (expressed as milligrams per kilogram of body weight) **required to kill 50% of a test population.**
- Tests for carcinogenicity (tumour formation), teratogenicity (birth defects) and mutagenicity (genetic damage) are also done. Other tests include studies on the environmental fate of the chemicals and effects on wildlife and other non-target organisms
- Over time, target species develop resistance to specific pesticides and dosages have to be increased or new pesticides developed. New pesticides now under development will likely be of biological origins
- Many pesticides are selective in their toxicity, being highly toxic to some organisms and much less so to others (The Canadian Encyclopedia, 2007).

Here's a natural tip: try bat houses they are a good natural way to keep your pest (bugs and insects) under control!

Commodification of Water

- Water is becoming a globalized corporate industry. Corporations are setting out to profit from the world's water shortage, trying to gain control of water through water desalination

and purification, the ownership of dams and waterways, bottled water, the privatization of municipal & regional water and water exportation.

- This commercial use of water not only creates extensive environmental problems but over tapping of ground water and rivers is causing a world food security crisis.
- Groundwater over-pumping and aquifer depletion are quickly becoming serious problems in intensive agricultural areas. The annual rise in population requires more water every year to produce grains for human and animal consumption. Heavy irrigation and hydroponic uses require more and more water in order to supply to world with food.
- Every year the world's exploding cities and industries necessitate more and more of the water designated for agricultural use. Eventually, some dry areas (i.e.: California) will not be able to meet the needs of both farming and growing cities. If these areas want to meet their daily water needs they may have to permanently import all/most of their food.
- This lack of water will make some countries permanently dependent on others, or on a host of other countries. This leads to issues of transportation and the high environmental cost of using fuel. Also, while rich countries are able to import food and continue to meet their cities water needs, other countries will not be able to afford this, causing issues of food and water security as well as increasing the rich-poor gap.

Environmental Impacts of Industrial Meat Production

You are what you eat?

Vegetarian animals in feedlots are being fed livestock parts. These graphic images are fresh in our minds. Now is the time to consider the nature of the food that fuels our bodies and where it comes from!

- Development of giant feedlots or mega-barns where animal husbandry is replaced by mechanized production
- Unlike the traditional mixed farms where livestock raised was well-matched with crops that could use the manure, these feedlots generate huge amounts of liquid manure that must be stored and disposed of
- Manure overwhelms the ability of local cropland to absorb it all safely
- Gigantic liquid manure lagoons can leak or rupture, contaminating groundwater, streams, rivers and estuaries with nitrates, phosphates, antibiotics and other drugs, and disease vectors like bacteria and viruses
- Factory farms are also a source of toxic air pollution and odours (Molnar, 1997).

The Hog Industry

The hog industry is the most controversial animal industry at the present moment in Canada. Large concentrations of animals produce waste disposal and odor problems that often create widespread hostility in surrounding communities. Additional concerns have been raised about

the connections between industrialized animal production and the well being and continued viability of family farms.

Interesting Facts

- Hog farmers in Quebec hope to produce 11.5 piglets each litter
- A hog's gestation period is 3 months, 3 weeks and 3 days
- Piglets are taken away from their mother soon after they are born so she will come into heat again
- To increase production and profit, hogs are bred four times a year
- Hundreds of thousands of piglets are produced on a farm with 3000 head of hogs
- Natural conception is not practiced on many hog farms, It is more efficient to artificially inseminate the hogs
- Hogs are kept in small confining spaces to limit there mobility in order to keep there muscles lean
- Millions of animals die annually while being transported, this is due to suffocation and cold and hot weather conditions
- Piglets suffer the pain of castration and tail-docking
- Most hogs will become sick with pneumonia at some point in their life before being shipped to the slaughter house

Source: Latulippe, 2002

Implications of Farming

Mad Cow Disease

- Also known as Bovine Spongiform Encephalopathy (BSE) is a fatal disease in cattle that causes a spongy degeneration in the brain and spinal cord. The theory accepted by most scientists is that BSE is caused by a prion. The agent does not invoke a detectable immune response or inflammatory reaction in its host and is extremely resistant to sterilization processes.
- First BSE case in Canada was in May 2003, found in the carcass of an Alberta cow. No part of the animal entered the human food supply
- Countries refused to accepts Canadian cattle and beef as imports which had a major impact on the farming industry; it lost more than \$2.2 billion since the border closed.

Approximately 14 000 head of cattle was exported each week to US prior to the border closure. Cows that normally sold for \$1,300 were selling for \$15.
Before BSE, farmers were getting around \$1.30 per pound. Today, farmers are only getting \$0.70 per pound. As of November 26, 2007 border is fully open to Canadian cattle.

- BSE is spread to cattle through feeding of contaminated meat and bone meal from scrapie-infected sheep or cattle with previously unidentified BSE. No treatment currently exists for cattle affected with BSE. Canada has banned the feeding of rendered protein products from ruminant animals (cattle, sheep, goats, bison, elk or deer) to other ruminants. Canada requires the removal of certain cattle tissues, from all animals slaughtered for human consumption.

Safeguards in place to protect against BSE:

- removal of potentially harmful cattle tissues from the human food supply.
- The Canadian Cattle Identification Agency implemented a tagging program in 2002. The program is aimed at allowing government and industry to track cattle from birth to death.

Health Canada, 2005

- The purpose of Industrial farms is to produce as much product as possible with the lowest cost inputs. Because of this, unnatural products such as meat and bone meal from other animals are used in the feed of industrialized farms to reduce the costs. Some of the unnatural product may contain infected prion (proteins) that causes BSE. The large number of cattle from factory farms eating this infected feed increases the number of cattle that can spread the disease. Generally, the same feed company continually supplies a farm with feed, which means that the feed will likely continue to contain infected prion.
- Level of BSE in Canada is extremely low and declining. With increasing testing, the Government of Canada expected some additional cases of BSE would be discovered but measures are in place to protect Canadians.
- By doing this Canada is working toward the eradication of BSE from the national cattle herd.

Foot and Mouth

- Is a severe, highly contagious viral disease of cattle, swine, sheep, goats, deer and other cloven-hoofed ruminants. Horses are not affected.

Alberta Government, 2007.

Foot and Mouth is spread by:

- | | |
|---|----------------------|
| - direct contact b/w infected animals | - clothing |
| - contaminated animal products | - holding facilities |
| - footwear | - equipment |
| - humans in contact with infected animals | - vehicles |

- Animals that have been exposed to the virus, but are several days away from showing signs, can spread the virus. The virus can survive up to 14 days on clothing, months in meat and dairy products and up to 200 days in manure, straw and soil.
- If an outbreak occurred it could spread rapidly to all parts of the country through routine livestock movements. In order to prevent spread of the disease, all farm visitors should follow biosecurity measures such as washing and disinfecting all personal effects and equipment used on any other farms that have accompanied them. It is particularly important to clean and disinfect footwear or provide visitors with footwear.
- Because there is a large number of animals on an industrialized farm the disease is spread easily through contact with people or other animals that have been infected. The large population of cattle on industrialized farms means that is potential for a quick spread of the disease to a large number of animals. Since cattle are brought into factory farms from other farms, it also increases the risk of spreading the disease. As well, a large number of staff is needed to manage the cattle as well, which means that the disease could spread on clothing or boots. The employees could be the cause of the disease spreading.
- The Canadian Food Inspection Agency (CFIA) is the lead agency for Foot And Mouth disease. If this disease is suspected on a farm, the CFIA will be contacted. CFIA will take the lead role in controlling this disease if it should come to Canada. If the disease is suspected the farm will be quarantined until confirmatory tests are completed.

Canadian Food Inspection Agency, 2007

References

Alberta Government. 2007. Foot and Mouth Disease. Online. www1.agric.gov.ab.ca.

Appleby, M. 2007. Sustainable Agriculture. The Humane Society of the United States.

Bryce, Susan. "The Privatisation of Water." Nexus Magazine May 2001. Oct.-Nov. 2007, Volume 8, Number 3<<http://www.nexusmagazine.com/articles/waterprivat.html>>.

Canadian Food and Inspection Agency. 2007. Foot and Mouth Disease. Online.

<http://www.inspection.gc.ca>.

"Greenhouse Tomato." Agriculture and Agri-Food Canada. 22 Nov. 2007. Government of Canada. Nov. 2007 <<http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1188310981709?=e>>.

Health Canada. 2005. BSE (Mad Cow Disease) and Food Safety. Online. www.hc-sc.gc.ca.

Jennissen, T. (1992). "Health Issues in Rural Canada". (Retrieved on November 18, 2007 from <http://dsp-psd.pwgsc.gc.ca/Collection-R/LoPBdP/BP/bp325-e.htm#A.%20Farmerstxt>).

Kissock, H. 2007. Agriculture. Weigl Educational Publishers Limited, Calgary.

Latulippe, H. (2001). Bacon, The Film. National Film Board of Canada, Montreal, Quebec, Canada.

Lobao, L. (2000). Industrialized Farming and Its Relationship to Community Well-Being. Ohio State University.

Molnar, J. & Hoban, T. & Parrish J. & Futreal, M. (1997). "Industrialization of Agriculture: Trends, Spatial Patterns, and Implications for Field-Level Application". (retrieved on November 23, 2007 from <http://www.ag.auburn.edu/agec/agec-archive-20050705/faculty/molnardir/agind.htm>).

Natural Resources Conservation Service, 2007. Industrialization of Agriculture: Trends, Spatial Patterns, and Implications for Field-Level Application. www.ag.auburn.edu.

Postel, Sandra. Last Oasis: Facing Water Scarcity. New York: W. W. Norton & Company, 1997.

Scharplaz, J. (2003). "Complete Industrialization of Farming: Weeding Out the Skilled Farmer". (retrieved on November 14, 2007 from <http://www.mindfully.org/Farm/2003/Industrialization-Of-Farming25nov03.htm>).

Statistic Canada, (2006). "Health of Farmers". (retrieved on November 14, 2007 from www.statisticcanada.ca).

Statistics Canada, 2006. Online. <http://www.statcan.ca/menu-en.htm>.

The Canadian Encyclopedia. (2007). "Fertilizers" (retrieved on November 23, 2007 from <http://www.thecanadianencyclopedia.com.cat1.lib.trentu.ca:8080/index.cfm?PgNm=TCE&Params=A1ARTA0006238>).

The Canadian Encyclopedia. (2007). "Pesticides" (retrieved on November 23, 2007 from <http://www.thecanadianencyclopedia.com.cat1.lib.trentu.ca:8080/index.cfm?PgNm=TCE&Params=A1ARTA0006238>).

The Seasonal Agricultural Workers Program. (2006). Justica/Justice for Migrant Workers. 23 Mar. 2006. JFMW. Oct.-Nov. 2007 <<http://www.justicia4migrantworkers.org/saw.htm>>.

United States Protection Agency. (2007). "Lake Erie Phosphorus" (retrieved on November 23, 2007 from <http://www.epa.gov/glnpo/glindicators/water/phosphorusb.html>).

Wikipedia. (2007). "The Industrialization of Farming" (retrieved on November 15, 2007 from www.wikipedia.com).