

Is Nova Scotia Eating Local?

and if not...

Where is our food coming from?



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Executive Summary

In Nova Scotia, our diet is primarily made up of foods imported from outside this province. There is nothing inherently wrong with importing food. But there are costs associated with importing most of our food. In particular, importing foods that we are able to produce here, like apples or beef, reduces opportunities for our producers. We don't know exactly what portion of our diet is imported. But we do know that at most 13% of the food dollars we spend are going back to Nova Scotia farmers. Our analysis shows that we could be producing and consuming significantly more Nova Scotia-grown food than we are now.

This report examines many of the costs and benefits of our present food system, and estimates the effects of increased spending on local food. We found that some of the most compelling reasons for supporting local growers are social and economic.

The average distance food travels to get to our store shelves has risen significantly in recent years as our grocery stores source more products from an increasingly global food system. One study showed that the average number of kilometers embodied in the food we eat – which includes transport of inputs like feed and machinery to farms, from farms to processors, and on through to wholesalers and stores – is an astounding 8,240 km (Weber & Matthews 2008). This does not include the extra kilometers food travels when we make shopping trips to those grocery stores.

The National Nutritious Food Basket is a list of foods that reflects the eating habits of Canadians, and meets their nutritional needs according to the Canada Food Guide. The average distance traveled by an item in the food basket from its origin to Halifax, NS is 3,976 km. This distance does not include farm inputs or additional kilometres for warehousing or shopping trips.

Despite the fact that our food travels great distances, on average, the transport is sometimes a minor portion of the cost and environmental impact of that food. When food is produced and processed in very large quantities, the transport impact, per unit of product, can be low. No universal statement can be made about food items and the impact of their food miles. Each item has to be assessed on its own. We have provided examples in the main report and throughout the case studies in this executive summary.

Below we examine economic and social benefits of local agriculture. Chapters on transportation and energy follow. A detailed look at our degree of self-reliance shows how much we produce relative to consumption. This is followed by the weighted average distances traveled by foods in the National Nutritious Food Basket. A chapter on local food procurement outlines options for increasing the demand for locally-produced food through government purchasing. Finally, there are case studies that get into more detail about specific products we grow here such as beef or tomatoes. At the end are conclusions and recommendations.

Economic benefits

One of the key reasons for choosing to buy locally-produced food rather than imported food, is to foster economically viable farming businesses and farming communities in Nova Scotia. The replacement of locally produced food by imports from outside a region transfers the financial benefits of that production activity to the region providing the imported product (Roberts et al 2005:2).

Nova Scotia is presently losing farms, along with the interwoven businesses that supply their inputs or process and distribute their products. Farm communities are unraveling. To keep the farms we have, encourage new farmers, and prevent the bleeding out of businesses that make up a local food system, a move to support local farms via our food dollar couldn't come fast enough.

We examine the economic benefits to Nova Scotia that flow from local agriculture (Table 1). Then we ask if buying locally-produced food actually helps farmers. A healthy food system would have benefits flowing in both directions. Even though Nova Scotia farmers are producing more product each year, their average total net income is going down, as is their share of the food dollar. These trends clearly show that to have farms in this province, food needs to be purchased in a way that ensures farmers can recoup their costs of production. If our farms disappear, we won't have the option to buy local food, which leads to higher prices for imported food, as well as a loss of food sovereignty.

One of the reasons imported food is considered to be attractive, is because it is assumed to be cheaper than locally-produced food. This is not universally true. First of all, there are costs that are not reflected in the price of imported foods. Also, having a local food system gives customers the option to buy directly from producers at a reduced price, and gives producers the option to reclaim some of the margins normally charged by retailers and wholesalers. This arrangement can be beneficial for both customer and producer. The type of food, degree of processing, convenience, and vendor usually has more effect on price than whether it is local or not. Another thing to consider is whether the price of food, whether imported or local, is too low. Farmers are often not covering the production costs for the food they produce, and the proportion of our income spent on food is going down. Most of us could stand to pay a little more for food items so that farmers can make a living. Consider the *average proportion of household expenditures spent on food*. In 1969, Canadians spent an average of 19% of household expenditures on food, and now we spend an average of 10%. We spend a lower proportion of total household expenditure on food than people in many other countries, including the USA and Australia.

Table 1: Summary Table - Economic Benefits of Local Agriculture

Nova Scotia Agriculture	Economic Benefit
Direct annual farm spending	\$460 million in farm operating expenses (2008) ¹
Gross annual farm spending: direct, indirect, and induced effect of farm spending	\$1.16 billion (2004 estimate) ²
Total annual employment: direct, indirect, and induced employment from farming activity	10,281 full time equivalent jobs (2004 estimate) ³
Total annual contribution to GDP: direct, indirect, and induced GDP	\$400 million (2004 estimate) ⁴
Annual contributions to Federal and Provincial Tax revenues	\$154 million (2004 estimate) ⁵
Eating local beef instead of imported beef	Increase annual farm cash receipts by at least \$67.5 million and increase employment in the sector to 1,900 jobs
Eating local lamb instead of imported lamb	Increase annual farm cash receipts by at least \$8.7 million and increase employment in the sector to 213 jobs
If Vermont substituted local production for only ten percent of the food they import	\$376 million in new economic output, including \$69 million in personal earnings from 3,616 new jobs (2000 estimate) ⁶

Social benefits and the food community

Buying locally-produced food, especially in a way that provides a fair price to producers, generates social benefits in this province. These social benefits include nutritious food, entrepreneurial energy, work ethic, mentorship, mutual reliance, relationship-based economic activity, and maintenance of farming communities. Buying imported food generates none of these benefits.

One could argue that imported food provides a greater variety of products for less money than it would cost to grow or raise them here. The economies of scale from large agribusiness in the global food system bring us unlimited supply supposedly at the cheapest price possible. But we need to distinguish between ‘price’ and ‘value’. Does importing most of our food bring us better food value than what our own farms can provide? Does the price we pay for imported food somehow compensate us for all the social costs

¹ Statistics Canada, for the year 2008, adjusted to \$2007 dollars.

² Estimate in 2004 (\$2004 dollars), Roberts et al 2005.

³ Estimate in 2004, Roberts et al 2005.

⁴ Estimate in 2004 (\$2004 dollars), Roberts et al 2005.

⁵ Estimate in 2004 (\$2004 dollars), Roberts et al 2005.

⁶ Hoffer & Kahler 2000: <http://www.vtlivablewage.org/JOBGAP6a.pdf>

associated with displacing our family farms? Is the money we spend giving us vital and nutritious food, or is it going into advertising, corporate profits, transport, packaging, and preservatives? In a scenario where most of our food is produced in this region, we could still import some of our food. But we would discover the variety of foods we can grow here while at the same time supporting our farmers. The social benefits of a local food system could be the most important reason for buying locally-produced food.

Social benefits and costs are the most difficult to measure and put a value on. That is why they remain hidden. We don't notice social losses until they are gone and it is too late. We are often not aware of all the ways our spending habits affect people and community life. In cases when we *are* aware, we make much better, but seemingly 'irrational' decisions. We buy apples from the guy we know is the main organizer of the community fair because of his involvement *and* because they are great apples. It doesn't matter that his 10 lb bags cost a little more. We go to the farmers' market instead of the grocery store because we like the vendors and get gardening advice from them. Some people go to a particular u-pick because their parents and grandparents took them there as children. In cases where is a positive connection, price becomes less of an issue.

Knowing the social circumstances surrounding a product can affect our food-buying decisions, which in turn affect the social circumstances. But in many cases we don't know those circumstances. In fact, for the global food system to work effectively, it is important that we know as little as possible. It is difficult enough to go into a grocery store and figure out where products are from, let alone who is producing them and how. As the gap between consumers and producers widens, and our ignorance of food production grows, we will make poorer decisions with our food dollars, causing our communities to suffer. Table 2 outlines the social benefits of a more locally-based food system.

Table 2: Summary Table -- Social Benefits of Nova Scotia Agriculture

Benefits to rural communities	Employment
	Stability and durability
	Maintenance of rural infrastructure
Benefits for people and relationships	Farming culture
	Social capital
	Mutual reliance
	Trust
	Relationship-based economic activity (Farmers' Markets)
Province-wide benefits	Food sovereignty
	Integrity
	Variety and choice
	Eating locally-produced food makes at-home eating worth the time and effort.
	Nutritional quality and vitality of food
	Stewardship

Transportation

Transportation is only one stage in the life-cycle of a particular food item. It is important to reduce CO₂ emissions in the food supply chain as a whole, and not to reduce emissions in one area at the expense of another. As the food system becomes increasingly industrialized, and food is processed and transported in ever-larger bulk quantities, transportation becomes a smaller portion of the total energy used to get a product to the consumer. However, the transport stage is growing relative to other life-cycle stages.

Among the problems with a food system becoming more industrialized and globalized, six are identified in this report. The first is that when food is imported, the economic and social benefits of growing that food locally are foregone. Second, food, and the inputs for growing that food, are being transported ever greater distances as more global sourcing occurs. More than 8,000 km is now estimated to be the average distance. Third, redundant or unnecessary trade is so common. There are reasons for importing and exporting the same items, like apples, or beef, but we should examine those reasons more carefully if we want to conserve resources and support our farmers. Fourth, food freight is shifting to less sustainable modes. More food, for instance, is being shipped by transport truck instead of train. Fifth, road transport is publicly subsidized because highways are built and maintained with taxpayers' money. We are inadvertently putting more trucks on the road and taking more farmers off the land because we are not charging the full cost of using that infrastructure. Finally, there is an increasing environmental and monetary cost of transport as climate systems are stressed from greenhouse gas emissions and our bodies are stressed from transport pollution. Table 3 summarizes the findings presented in this chapter.

Table 3: Summary of Chapter on Transportation

Average distance food travels, including farm inputs	More than 8,000 km plus 35% for food shopping
Differences in emissions between modes of travel (grams CO ₂ -equivalent per Tonne-km)	Rail: 17 Ship (water): 222 Road: 204 Air: 1439
Cost of greenhouse gas emissions	\$45/tonne CO ₂ -equivalent
Freight transport damage to highways	<ul style="list-style-type: none"> • <i>almost all</i> the damage done to asphalt pavements is from <i>heavy trucks</i> • single-unit trucks and combination trucks, imposes the same amount of roadway damage as 9,600 cars
Actual net public cost of freight transport by highway, NS	\$4.06 per tonne-km in 1999
Estimate of total public cost of food freight transport by highway,	\$551 million in 1999

NS	
Estimated pollution cost of freight transport by highway, NS	\$3.16 per tonne-km in 1999
Estimate of total public cost of pollution from food freight transport by highway, NS	\$429 million in 1999
Estimate of full costs, including financial and social costs for freight in Canada, 2008	Truck: \$0.22 per tonne-km Rail: \$0.024 per tonne-km Air: \$0.623 per tonne-km
Estimated energy cost of vehicle manufacture	The energy consumed during vehicle manufacture can amount to a quarter of the energy consumed in the life of the vehicle
Cost of a weekly basket of food for one person, UK	\$37.57 Canadian
Full cost of a weekly basket of food for one person, UK, including externalities and subsidies	\$41.94 Canadian - 12% more

Energy

Determining energy use or GHG (and other) emissions in the food system helps us understand where we most effectively can reduce our consumption of finite resources (such as oil or coal) and reduce our polluting emissions. Studies of energy use in the US food system show that the major energy-using phases of the system are processing and packaging (more than 20% of total energy use) or the household storage and preparation phase at 25% or 31%, depending on the source.

To effectively reduce our consumption of non-renewable fuels, and emissions of greenhouse gasses and other pollutants, the studies reviewed strongly suggest the following:

- Reduce the consumption of junk food with empty calories;
- Where possible, replace the use of synthetic fertilizer, particularly nitrogen fertilizer, with local sources of nitrogen such as cover crops and animal manures;
- Reduce dependence on refrigeration and freezing because they are very energy-intensive in the food system. These are particularly important for long-distance food transport. Low-energy alternative food storage and preservation methods can be used in a local food system;
- Reduce food waste because it accounts for one quarter of all food sold; and
- Shift diets to correspond to food available locally in season.

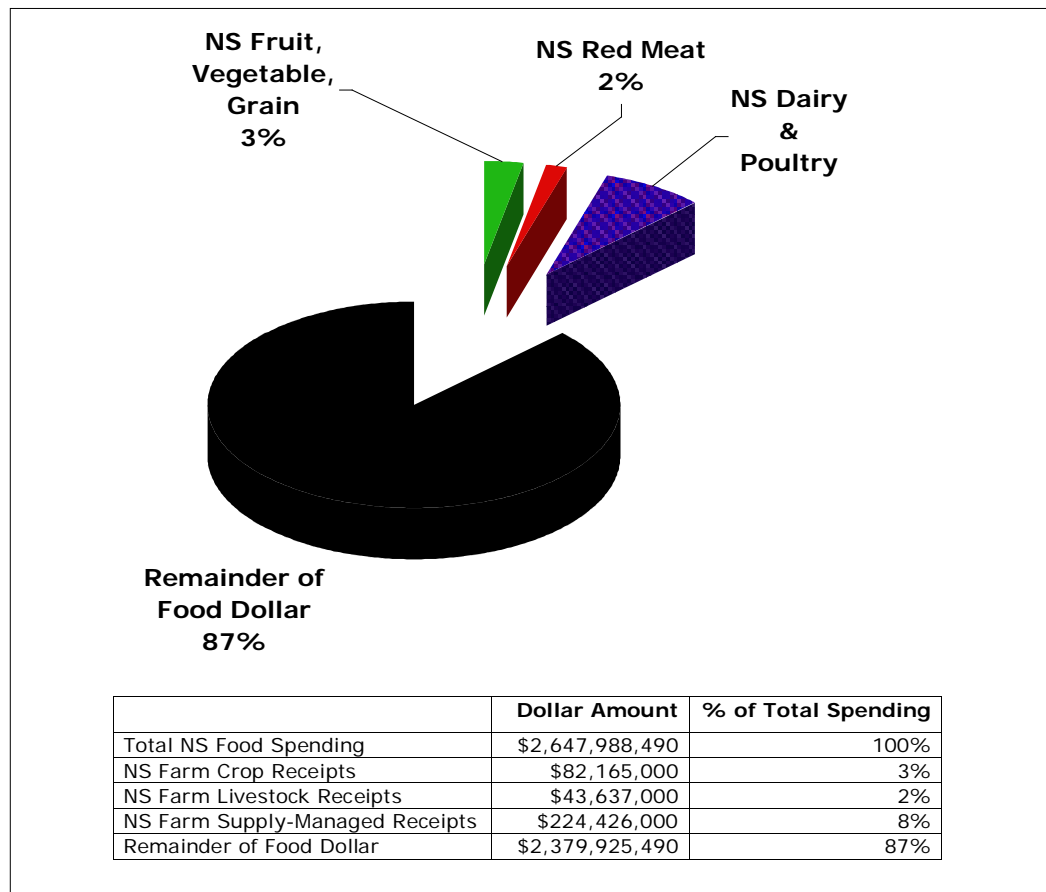
A conclusion from the LCA studies shows that in some cases, large-scale global food companies shipping products around the world can do so more efficiently (in terms of energy per unit product) than the local food system. The methodological problems with

these studies are discussed in greater detail in the Energy chapter, but it should be recognized that economies of scale do provide some opportunities for energy efficiency.

Self-Reliance

At the national level, Statistics Canada data show that over the last four decades, food imports are rising relative to net supply. At the regional level, grocery store data show that most of the food in stores is imported from outside Atlantic Canada. At the provincial level, we know that in 2008 *at most*, 13% of the food dollar is being earned by Nova Scotia farmers (Figure 1). Over the last 11 years, this proportion has gone down. In 1997 it was 17%.

Figure 1: Food Spending Relative to Farm Cash Receipts, Nova Scotia, 2008⁷



⁷ Derived by removing all non-food items such as furs, flowers, and Christmas trees from the table of Nova Scotia total farm cash receipts in Statistics Canada's Farm Cash Receipts – Agriculture Economic Statistics series. Cat. No. 21-011-X. Latest Update: May 2010.

Finally, we calculated production divided by consumption for vegetables, fruit and meat in Nova Scotia. The results can be found in Tables 4, 5, and 6.

Table 4: Nova Scotia Vegetable Self-Reliance 2008

Crop	Production divided by Fresh Consumption	Production divided by Fresh & Processed Consumption	Percentage of NS consumption that is locally produced (estimate)
Asparagus	1%	1%	
Beans	22%	10%	
Beets	45%	51%	
Cabbage	184%	-	90-100% of supply from July to April from Maritimes
Carrots	652%	476%	8 months of year all are from Maritimes Close to 100% from July to April
Cauliflower	35% ⁸	32% ²⁴	
Celery	0%	-	No commercially produced celery in NS
Corn (sweet)	35%	13%	
Cucumbers (field only)	4%	-	
Lettuce	1%	-	
Onion (Dry)	95%	-	85% from August to June (Maritimes) 90-100% August to April from Maritimes
Parsnips	14% ⁹	-	
Peas	22%	3%	
Peppers	1% ⁴	-	
Potatoes	97%	42%	
Radishes	0%	-	
Rutabagas & Turnips	127%	-	All turnips from Maritimes 90-100% From July

⁸ 2003 data, as this is the most recent data available

⁹ 2004 data, as this is the most recent data available

			to April from Maritimes
Spinach	8% ¹⁰	5% ²⁶	
Tomatoes (field only)	2%	-	
Total Tomato (incl Greenhouse)	24% ²⁶	6% ²⁶	

Table 5: Nova Scotia Fruit Self-Reliance 2008

Crop	Production divided by fresh consumption	Production divided by fresh and processed consumption	Percentage of NS consumption that is locally produced (estimate)
Apples	390%	182%	40 - 60%
Blueberries	1832%	1104%	
Peaches	7%	4%	
Pears	23%	20%	
Plums & Prunes	14%	-	
Strawberries	38%	32%	

Table 6: Nova Scotia Livestock Self-Reliance 2007

Livestock	Production divided by Consumption (based on Stats Canada slaughter numbers)	Production divided by Consumption (based on slaughter numbers from other sources)	Percentage of NS consumption that is locally produced (estimate)
Pork	56%	52% ¹¹	
Chicken	117%	--	
Beef	27%	12% ¹²	1-5%
Sheep & Lamb	25%	17% ¹³	

Given the various calculations of self-reliance for Nova Scotia, there is a general downward trend in self-reliance (outside of supply managed commodities). However, the

¹⁰ 2007 data, as this is the most recent data available

¹¹ Production data (slaughter numbers) from Pork NS

¹² This an Atlantic figure, based on beef production in all four Atlantic provinces, divided by slaughter number from all provincially inspected plants and an estimate of slaughter at the federally inspected plant in PEI. Provincial data from Agriculture and Agri-Food Canada, Provincial Slaughter - Annual Report (A009E). Federal data based on estimate from cattle farmer.

¹³ Production data from Agriculture and Agri-Food Canada. 2007. Atlantic Provinces Weekly Livestock Market Report, for the week ended Dec 29, 2007.

numbers also indicate great potential for producing more of our food – if it was economically viable to do so.

Distance Traveled and Emissions of a Food Basket

In order to calculate the distance food is traveling, we chose to use the National Nutritious Food Basket (NNFB) tool. The NNFB contains 66 food items, from 11 different food groupings which reflect the eating habits of Canadians, as well, these foods, in appropriate combinations and amounts, were designed to meet the nutritional needs of Canadians according to the 1992 Canada Food Guide.

The average distance traveled by NNFB food items is 3,976 km.

When a weekly diet is considered, the weekly basket of goods travels a total distance of 30,666 km and emits 5.911 kg CO₂e. The distances and GHG emissions for a theoretical “all-local NNFB basket” were also calculated. To maintain continuity, we estimated 350 km for travel within the province for all local foods. The theoretical, all-local basket is approximately a sixth of the distance and emissions: 4988 km and 1.017 kg CO₂e.

There is potential for reducing transport greenhouse gas emissions by switching to more local fruits and vegetables, provided that the fruit and vegetable crops are produced by methods that are of similar or increased energy efficiency compared with imports. Though not included in the NNFB, we produce large quantities of blueberries, as well as variety of tree fruits and berries. We also produce a wide variety of horticultural crops. With low-energy season extension techniques, cold storage, processing and preserving – at both the industrial level and the household level – there is a lot of potential to increase local fruit and vegetable consumption throughout the year.

For foods that we cannot easily produce here, we should promote more energy-efficient modes of transportation, i.e. rail, or consider local alternatives, if they exist, e.g. honey and maple syrup in place of sugar.

Case Study:

Local vs. Imported Vegetables and Fruit

With the industrialization and globalization of our food system, our food habits have changed. We are now eating more processed, convenience, and junk food – loaded with sugar and preservatives. We are eating fewer vegetables and fruit than we used to, and *need* to for optimum health. According to recent Statistics Canada figures, “less than one-third (29%) of Nova Scotians over age 12 eat the recommended 5-10 servings of fruit and vegetables every day. This compares to 35% nationally” (Healthy Eating Action Group 2005: 21).

In order to relocalize our food system, our diets will need to shift. We'll need to relearn how to enjoy our own farm products, how to structure our meals according to seasonal availability, and how to store and preserve our own bounty. This shift will produce health benefits as we reduce the amount of money we spend on junk food and increase the proportion we spend on real food from our farms.

Vegetables

A surprisingly small proportion of the vegetables we eat in Nova Scotia are actually grown here. We produce roughly enough (or more) cabbage, carrots, onions, potatoes, and turnips to supply our own needs. There is a logic to producing these crops here, where cropping shuts down for several months every year, because they can be stored for winter use. We could, however, be producing – and eating - a higher proportion of the other vegetables we produce here. Also, with season-extending unheated greenhouses, we could be producing more of the tender crops we eat so much of, like tomatoes, spinach, or lettuce.

Consider tomatoes. Fresh production, with the help of season-extension, could run from July through November (5 months), so we'd need to use processed tomatoes for 7 months (or buy greenhouse tomatoes). Estimated average annual consumption of fresh and processed tomatoes in 2007 in NS is 29.18 kg/person. If tomato consumption is roughly equivalent in each month of the year, we need to process 17.02 kg of tomatoes per person for the cold months. Home freezing and canning were compared with purchasing imported tomatoes (Table 7).

Often people think that buying locally produced food is more expensive than imported food. Here is an example that clearly shows how the local option is less expensive personally and socially. When we include the real costs in a comparison of tomato buying options for the 7 months they are not available in Nova Scotia, the least expensive and most benefit-generating option is to buy local tomatoes in bulk at the peak of the season and preserve them for home use (\$32.92 per person). This option also produces the fewest GHG emissions. The most expensive option is to buy imported fresh tomatoes (\$95.04 per person).

Table 7: Summary Comparison of Imports with Two Ways to Preserve 7 Months of Tomatoes (17.02 kg) for each Nova Scotian¹⁴

	Import Fresh	Import Canned	Home Freezing	Home Canning
Greenhouse gas emissions (kg CO₂-e /person/ year)	16 kg (for transport)	16 kg (for transport)	35 kg (for electricity to freeze)	5 kg (for electricity to preserve the tomatoes in glass jars)

¹⁴ See text for explanation of calculations

Full cost per person	\$95.04 plus the cost of grocery shopping trips	\$48.14 plus the cost of grocery shopping trips and the costs of manufacturing and disposing of tins	\$36.57 plus the cost of a freezer and the cost of a trip to get bulk tomatoes	\$32.92 plus the cost of a trip to get bulk tomatoes
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Currently we eat 27.3 million kg of tomatoes, but we only produce 1.7 million kg. Therefore we import 25.6 million kg. This works out to about \$56.3 million¹⁵ in potential income to local farmers if Nova Scotians switch to better-tasting locally-grown tomatoes. Since the employment benefits per \$1,000 of agricultural output is 0.0213 (Roberts et al 2005), eating 100% local tomatoes would create an estimated 1,200 jobs. In addition to the economic benefits of buying locally-produced tomatoes, there are a number of social benefits. These include connection and support to the farming community, better quality tomatoes, and possibly an injection of useful skills and social interaction if people got together in the fall to purchase and preserve tomatoes. Good-tasting local tomatoes could encourage people to eat more than they do now, which is a good thing because currently Nova Scotians are not eating enough vegetables (Healthy Eating Action Group 2005).

Fruit

Nova Scotia farmers produce a wide variety of fruit. We are historically best known for apples, and we still export apples out of province. We produce nearly twice our consumption of fresh and processed apples. Yet, we import about 50% of the apples we eat. The weighted average distance traveled by apples imported from out of province is 7,443 km. This is a prime example of redundant trade. We are importing apples, as we are simultaneously exporting them.

To estimate the cost of just *transporting* apples to Nova Scotia, the estimated total consumption of apples is multiplied by 50% (the approximate percentage of imports) to get the approximate weight of apples imported: 4,966 tonnes. This is multiplied by the average weighted distance apples are shipped (7,443 km) to get 37 million tonne-km. This is multiplied by \$0.22 per tonne-km¹⁶ to estimate the real cost of importing apples we can produce ourselves: \$8 million per year. To gain a full picture of the cost of redundant apple trade, the cost of shipping our apples *out* of province would have to be included. The total annual GHG emissions for importing apples is 7,961 tonnes CO₂-equivalent.

In addition to redundant trade in apples, we eat a lot of fruit that isn't grown here. Besides apples, the top fruits eaten are bananas, melons, and oranges. Although we

¹⁵ At a low price of \$1/lb or \$2.20/kg. Most tomatoes are sold for more, which would generate additional income for farmers.

¹⁶ Transport Canada's total cost estimate of road freight (Transport Canada 2008). Not all apples are imported by road freight, but this is a start for estimating the real cost for transporting apples to Nova Scotia. The total cost estimate includes infrastructure capital costs, infrastructure operating costs, carrier/vehicle costs, congestion delay costs, accident costs, and environmental costs (these include GHG, noise, and air pollution).

produce some melons in Nova Scotia, we don't produce any bananas or oranges. We are well known for producing blueberries, but we also produce raspberries, strawberries, plums, pears, and peaches. There seems to be a tradition of picking and preserving strawberries when they are in season (by freezing or making jam). It is a social event. This tradition could be reclaimed for our other northern fruits. Buying directly at U-picks can provide a day out on the farm, reasonably priced fruit, and a freezer full of local fruit for smoothies all year. With such an array of locally-produced fruit available, especially in the summer and fall, it is a shame to pass it up for imported fruits all the time.

Case study: Benefits of Beef Import Replacement

Presently we import most of the beef we eat in Nova Scotia from distant sources. It is finished in feedlots with grain and other by-products. It would not make sense for us to grain-finish beef here and compete with the feedlot system established in grain-growing regions like the Prairie Provinces. We simply don't have the excess grain needed. However we are missing a great opportunity to replace those imports with locally-grown beef fed on grass and clover – something we are great at growing in Nova Scotia.

The production and consumption of beef has a bad reputation for creating environmental and health problems. Unfortunately, this poor reputation connected with feedlot beef has overshadowed the potential for raising and consuming beef in a way that contributes to agricultural sustainability and good health. People tend to associate the ill effects from industrial beef production with all beef. Actually, community-based, primarily grass-fed beef systems generate many benefits for rural Nova Scotia and for consumers, including affordable beef products.

Some of the key findings about beef in Nova Scotia are as follows:

- Nova Scotians are eating roughly 90-99% imported beef from feedlots.
- Local beef production has great potential for improving soil quality and revitalizing rural communities.
- We have underutilized land and capacity that could be used for beef production.
- If we produced all the beef we eat in this province, farm cash receipts could increase from \$22.5 million to *at least* \$90 million/year and full-year equivalent employment would increase from 448 jobs to about 1,774 jobs.
- On average, beef imported to Nova Scotia creates 1.14 kg of CO₂-equivalent emissions per kg of beef imported, *just for the transportation*. The full cost estimate of this unnecessary transportation is \$30 million per year.
- Grass-fed beef meat is a healthy food: Beef cattle are fed primarily grasses and clover, which makes the meat low in saturated fat, yet high in omega-3 fatty acids, beta carotene/vitamin A, vitamin E, folic acid and antioxidants.
- Animal stress is lower where livestock are grazing compared with feedlot conditions. Ruminants – cud-chewing animals such as cattle, dairy cows, goats, bison, and sheep – are designed to eat fibrous grasses, plants, and shrubs—not starchy, low-fiber grain.

Case study: Sheep in Nova Scotia

Lamb (or sheep) production in Nova Scotia is an ecological way to produce two main products: meat, and wool. The third, hidden, product they produce, is excellent soil quality. Below are some of the benefits of replacing imported lamb with locally-grown lamb.

- We produce 15 - 18% of the lamb we consume in Nova Scotia, and import the rest
- Sheep production has great potential for improving soil quality
- If we produced all the lamb we eat in this province, farm cash receipts are estimated to increase from \$2 million to \$10.7 million/year and employment would increase from 40 full year equivalent jobs to 213 full year equivalent jobs.
- On average, lamb imported to Nova Scotia creates 4.08 kg of CO₂e emissions per kg of lamb imported.
- Lamb meat is a healthy food: lamb is fed primarily from grasses and clover, which makes the meat low in saturated fat, yet high in omega-3 fatty acids, beta carotene, vitamin E, folic acid and antioxidants.

Food Procurement

Government departments and institutions procure a wide range of goods and services in the course of their operations. Because of their size and relative stability, institutional procurement policies can help support the local agriculture system by providing a market for producers.

Below is a summary of existing local, sustainable procurement policies within government and institutions.

- **Federal Prisons:** No local or sustainable food policy. A policy to buy from prison farms does exist; however, Nova Scotia does not have any prison farms and existing prison farms are being closed across Canada.
- **Federal Government Departments:** Meeting guidelines for both Environment Canada and the Atlantic Branch of Health Canada suggest using local food where possible
- **Provincial Policies:** The sustainable procurement policy for the province of Nova Scotia was adopted in August 2009.
- **Health care facilities:** There are no official policies regarding the purchase of local food. Many health care facilities purchase food via contracts negotiated by NS Health Care Purchasing Limited. Capital District Health is in the process of revising their food and beverage policy and has recently established a farmers' market.
- **Schools:** The School Food and Nutrition Policy recommends buying local products when possible. The Strive for Five program promotes consumption of local fruits and vegetables through institutionally-scaled recipes and training for kitchen staff.

- **Universities:** Dalhousie University has plans to develop a sustainable food plan. Acadia University is currently conducting a sustainability assessment, which includes food purchased by the university. They currently purchase produce from the Acadia Farm, an on-campus community garden.
- **Municipalities:** Halifax Regional Municipality considers a range of sustainability criteria in its catering service qualification list. The Town of Bridgewater is including food in the town's Integrated Community Sustainability Plan.

Conclusion and Recommendations

The main theme that emerges from this report is about making prices more 'real'. The real cost of producing food should include fair wages for farmers and their workers as well as the ability to steward the land. It should include the real price of transportation, particularly road transportation. It should not include uneven subsidies, regulations and standards, be it subsidized water in California or less stringent pesticide regulations in other countries. And we should recognize the health benefits of eating wholesome food.

When a good diet creates a positive outcome that is a positive externality. In a place with public health care, like Canada, this kind of positive externality benefits everyone. When trucking causes increased maintenance costs on highways, and trucks aren't charged for it, that is a negative externality. Pollution, greenhouse gases, and ill-health from a bad diet are all examples of negative externalities. There is little incentive to be efficient, or eat well, if we don't have to pay for the damage, health care, or climate chaos resulting from our actions. If, somehow, we can internalize the externalities, both positive and negative, we will make much better decisions, and everyone will benefit more. When Swiss trucks are charged according to use and vehicle efficiency, that is internalizing a negative externality. When Madison CSA customers are given a rebate for eating fresh vegetables and fruits, that is internalizing a positive externality. These are the kinds of incentives that will maximize benefits for everyone. Below you will find a list of additional recommendations.

For Consumers

- Vote with your dollar. Support farmers' markets, farm markets, community supported agriculture (CSA) operations, buying clubs, and retailers and restaurants who support local farmers.
- Ask questions at the grocery store, restaurants, and institutions. Find out where they purchase their food and ask them to improve their labeling.
- Join or donate to one of the many organizations working on food issues in Nova Scotia and get active! For a listing of organizations, visit <http://www.nsfoodsecurity.org/>.
- Reduce the consumption of junk food and other foods of low nutritional value;
- Use low-energy alternative food storage and preservation methods, such as canning, dehydrating, lactofermentation, and root cellars;
- Reduce your food waste. Approximately one quarter of all food sold is wasted;

- Shift diets to correspond to food available locally in season.

For Farmers

- Farmers need to work together more, figure out what they want from government and ask for it;
- Forge new, unconventional, and powerful alliances. There are linkages forming between health, environmental, social justice, and anti-poverty organizations. There are allies in arts and culture organizations, schools, restaurants, gardening groups, faith groups, immigrant organizations and more.

For Food and Farming Organizations

- Keep momentum of present enthusiasm:
 - Forge new, unconventional, and powerful alliances;
 - Teach people how to cook, preserve, store, eat seasonally;
 - Emphasize fun, social aspect of local food. Keep it positive!
 - Set very public targets with allies. Make a plan. Include incentives. Measure progress!
 - Challenge grocery stores to compete regarding the percentage of local food offered
- Organize customer groups to buy directly from farmers. For example, direct beef orders through workplaces. Combine cooking and preserve-making classes with visits to farms to buy produce.
- Follow the examples set by organizations like the Madison Area Community Supported Agriculture Coalition (MACSAC) and organize events to promote CSAs, lobby for rebates from the Department of Health for CSA subscription rebates, and encourage those who can to donate funds to help lower income families get CSA subscriptions.
- Use existing programs to further a healthy local food system and increase sphere of influence. Open farm days, 4-H, Harvest Festivals and picnics, exhibitions, and community college programs all offer possibilities for connection.

For the Private Sector

- Be transparent in the labeling of food products. It is often very difficult to figure out where food items are coming from in a retail setting. Signage is often ambiguous or non-existent. Staff are not always well-informed as to the origins of particular food items.
- Conduct an audit of the food you currently purchase. Create a local, sustainable food procurement policy, with minimum targets that increase over time.
- Seek to replace imported food items that are easily grown in NS with products from our own farms.
- Greater transparency with regard to what is being sold in the grocery stores is needed. The Canadian Council of Grocery Distributors should compile and

publish what percentage of food is grown or produced in Atlantic Canada. These results should be available by food group (e.g. fruit, vegetables, dairy, meat). It is also important that the report display goods produced in Atlantic Canada separately from goods processed in Atlantic Canada to display an accurate assessment of the food system.

- Reintroduce options for producers to sell directly to grocery stores. The centralized distribution systems that have developed over the last few years have made it increasingly difficult for smaller producers to supply the larger supermarkets. There is some indication that this is changing¹⁷.
- Reduce food waste. Approximately one quarter of all food is wasted.
- Use low-energy alternative food storage and preservation methods.
- Invest in the local food movement, for example, through Slow Money.

For Government and Institutions

Procurement

- Develop and adopt local, sustainable procurement policies. Policies should include targets, with plans to increase the targets over time. Additionally, policy makers should carefully consider their definition of local, sustainable food, and extend the definition beyond basic geography to include sustainable production methods, social justice, and corporate responsibility.
- Implementation of local, sustainable procurement policies also has its challenges. Consider the following recommendations to overcome common barriers:
 - **Money.** Incentives to buy local food need to be created and money for food needs to be seen as an investment in Nova Scotia agriculture. Schools and hospitals have very limited food budgets. Schools, hospitals and other institutions have or will lose a revenue stream due to the loss of pouring contracts from soft drink companies as unhealthy foods are replaced. Additionally, some schools have experienced a decrease in sales due to a lack of uptake on healthier foods.
 - **Staffing.** Funding for additional staff and staff training is needed. This is tied to the issue above. More staff are needed to prepare food items from scratch than were needed to reheat and serve pre-prepared meals.
 - **Facilities.** Ensure institutions have proper kitchen facilities and equipment. For example, many schools were not built with kitchens, thus meal preparation options are very limited.
 - **Invest in a matchmaker position.** The current food service model is heavily reliant on a small number of large suppliers. It takes additional time and resources to for food service managers and farmers/small local suppliers to find one another. Additionally, some principals are now finding themselves in the position of running school cafeterias (as food service companies pull out). This becomes one more item added to their

¹⁷ Beating the odds - Local producer suppliers being welcomed back (2009, June 3)
CBC commentary, Donald Daigle, a vegetable producer in Acadieville, New Brunswick and chair of the Canadian Farm Business Management Council.

job description and principals may or may not have experience in running a cafeteria. A matchmaker would assist in connecting producers and food service managers.

- **Amend prohibitive policies.** According to Health Canada and the Food Safety Division of the Provincial Department of Agriculture, there is no legislation preventing institutions from buying provincially inspected meat products. Yet, it seems that some food service companies are required to use federally inspected products. This appears to be an internal policy. The policy of using only federally inspected meat limits the market for provincially inspected meat to restaurants and direct markets. (The grocery stores cannot buy provincially inspected meat either, as their distribution channels require food products to cross provincial boundaries.)
- **Foster an environment that supports a change in eating habits.** Elementary students have adapted more quickly to the healthy foods in their schools. The high school students are less receptive. Capital Health has expressed concern that people won't buy the healthier food options. Once the elementary students who are used to healthy food reach high school, it is more likely they will be more receptive to new, healthy cafeteria offerings.
- **Reduce waste.** Food waste represents approximately a quarter of all food sold. By reducing food waste, institutions can save money – money that could be used to pay farmers a fairer price.
- **Promote friendly competition!** Some Nova Scotia universities are tracking their local purchasing. If other universities, health care facilities and schools got on board, there could be a buy local competition.

Invest in Innovative Ideas

Money spent on local agricultural programs needs to be seen as an investment in our economy, our social fabric, our health, and our environment. In our research, we have come across innovative programs in other regions that could be implemented here, if there was financial support to do so. Here are some examples:

- **Watershed Agricultural Council** —This organization in New York State directs funds that would have been used to build water treatment facilities into supporting small farms and woodlot businesses. Their research shows that small farms and woodlots, if given funds to protect streams and wetlands, will protect the watershed more effectively than other land uses. The Council promotes the consumption of locally-produced food and wood products, and helps consumers connect the quality of their water with their support of watershed land stewards' businesses.
- **Matchmakers** – Individuals who link farmers with institutions, such as schools or universities. We met one such matchmaker in Massachusetts, Kelly Erwin, who describes herself as a 'dating service' for farmers and food service managers. She understands the needs and challenges faced by each party. She has a directory of farmers, knows what each grows and in approximately what quantity, and helps

them find schools and universities on their existing delivery routes. She develops resources for food service managers, such as local food cookbooks and seasonal availability charts. Five years into this initiative, she hopes that this job will become a permanent part of the Department of Agriculture.

- **Support for CSAs** – A Community Supported Agriculture (CSA) system is one in which a farm sells “shares” at the beginning of the season. Their customers receive a weekly basket of fresh farm products. In Nova Scotia we have about a dozen CSAs – Maine has over 100! In fact, the Maine Organic Farmers and Gardeners Association (MOFGA) has a staff person devoted to CSAs, providing resources and support for farmers interested in this marketing approach. Similarly MACSAC in Wisconsin has successfully made CSAs part of the mainstream. Their ideas about subsidizing CSA shares are worth adopting here.
- **Support for new farmers** – Who is going to grow all the food we are now so interested in eating? An apprentice/journeyman program for new farmers put on by MOFGA is attracting interest and teaching valuable skills to up and coming farmers. Also, the Intervale in Vermont allows new farmers to gain experience and use common land and equipment without a huge investment. Once they’ve proven their ideas work, they move on to create their own farms.

And there are some home-grown programs that should be continued

- **Direct Marketing Community Development Trust Fund.** This is a Nova Scotia fund administered by the Department of Agriculture. It is definitely needed, but currently over-subscribed. The monies for the fund should be increased.
- **Select Nova Scotia.**
- Infrastructure and support for new farmers’ markets. Establish economic development programs for farmers’ markets through market managers, promotional materials and producer co-ops.

Remove Policy Barriers

- Break down barriers related to provincial and federal meat inspection. Develop regulations and policies that promote, rather than discourage, the sale of provincially-inspected meat. Provincially inspected meat cannot cross provincial borders. This excludes provincially inspected meat from being sold in the grocery stores, as the distribution networks are set up on a Maritime basis. Certain institutions have policies that only allow them to purchase federally-inspected meat.
- Match food safety regulations to the scale of operations. Current regulations are prohibitive to smaller processors. We need diverse and decentralized food processing operations

Land Use

- Give priority to sustainable land use over non-sustainable land use when making development decisions
- Develop Working Land Conservation easements to protect farmland

- Ensure that activities in rural areas protect watersheds
- Preventative value of farm and farmland investments now

Municipal Governments

Traditionally municipal governments have not been involved in food systems, but there is growing interest and potential for municipalities to promote sustainable food systems

- Support farmers' markets.
- Support farmland conservation with municipal zoning
- Include food sovereignty in municipal plans, such as Integrated Community Sustainability Plans (ICSP)

National Food Policy

Across the country, citizens in each province are facing similar challenges in creating more sustainable, locally-based food systems. There is currently no national food policy, though both the NDP and Liberal parties have conducted consultations and the Liberals have developed one.

- We recommend that the government develop a federal food policy that is based on the principles of food sovereignty.

Introduction

The Nova Scotia Federation of Agriculture and the Ecology Action Centre joined forces to answer two pressing questions:

- How far is our food traveling to get from farms to food retail outlets?
&
- What percentage of our food is locally grown?

With these two questions at the fore, combing through various statistics and reports; it was evident that enthusiasm for locally grown food proliferated into a movement no one had predicted. This information is in high demand: across the media spectrum, in classrooms, grocery stores and at kitchen tables. Now with the report complete the answers to those two questions have been determined in estimate.

Our food is traveling close to 8,000 km on average from farm to plate, including the delivery of inputs to the farm needed to grow the food. An extraordinary distance. But the 'distance' is more than just the number of kilometers between farmers and consumers. Chapters in this report deal with this complex issue in more detail.

While the estimates are more ball park figures and by default not exact as a result of evasive sources within the food chain locally, regionally and nationally, it can be said that some figures are "confident" estimates (ie lamb or tomatoes) however, the overall picture is vague. Case studies to frame and better pinpoint our self reliance and ability to feed ourselves focus on individual items.

We do have a pretty good idea that at most 13% of our food dollars spent in this province go back to Nova Scotia farms. Unfortunately, this percentage has dropped by 4% in the last 11 years. The good news is, at 13%, we could be eating a lot more locally-grown food than we are now – a potential boon for producers.

These estimates, if generated using the same methods, can be useful for comparisons with other provinces or states, and for tracking change over time. Now that we have a number, we can measure it every year, and set targets. Do Nova Scotians feel the benefits from farming are important enough to try to spend more on local food? Do we want to have 20% -- or even more - - of our food dollars spent on local food? There would likely be resistance to a 100% target, and that is not being advocated here. Read on for further discussion of targets, potential market opportunities, and connected benefits in the Self-Reliance chapter and the Case Study chapters.

Self-reliance is not about closing borders or shutting out all imports. Competition fosters innovation. It is about a region being largely able to provide for its own needs, and not immediately experiencing crisis if flows into the region are cut off for any reason. In a self-reliant region, flows of product, resources, people, and ideas are not only needed but welcomed. But our province should be able to meet many of its own needs, create its own identity, build on its strengths, and use all of its inherent and adopted resources in an optimal manner.

There are many reasons for food imports. Some areas of the world are better at producing some products than other areas. For instance, it would make no sense for Nova Scotia to try to produce pineapples. There is also the issue of price, which prompts food distributors and retail chains to source goods from wherever they can be obtained most cheaply and where farm labour is

cheapest, even if there is a wide range of hidden costs associated with those imports and hidden benefits in local production that are not recognized or accounted for.

Efficiency is often cited as a key reason for increasingly high levels of food imports. Thus, it is conventionally considered more efficient to grow and process particular foods in large quantities where the factors of production are cheapest and then to transport them long distances, than to rely on smaller and more diverse production units domestically. In fact, a review of some Life Cycle Analysis studies showing the environmental and cost benefits of large scale agriculture and global sourcing of goods completely challenged our assumptions. We learn in the Energy chapter that large production units and shipping huge tanker-loads over the oceans was, in some cases, more energy-efficient per unit, and produced fewer greenhouse gas emissions than local agriculture for local consumption. But global sourcing of food may not measure up in terms of social and economic benefits for our farming communities and for our province. Check out the Economic Benefits and Social Benefits chapters for more detail.

Imports went too far. When cheap imports cause local farms to go out of business because they can't compete while adhering to higher labour and environmental standards, that is not optimizing anyone's benefits. Imports can be beneficial because they spur innovation and provide selection. But when they start putting our best farms out of business and cause our population to lose touch with our own agri culture, we need to take a really close look at externalities (costs that are generated by one party, but paid for by another) in order to make more benefit-optimizing decisions. See the Transportation chapter for more detail on how our tax dollars are helping to displace our farmers.

Do we want imported food to displace locally-produced food? Quite the opposite. Technology has changed. We can extend our growing season with non-heated greenhouses. Controlled atmosphere apple storage can keep fruit fresh all year. Hardy table grapes can store in cold rooms for months. We can grow delicious northern kiwis that don't need to be peeled. We are getting better at extending the grazing season for grass-fed livestock. We have livestock products all year (milk, eggs, meat, dairy products) and yet these things are imported. We can do a much better job of matching supply with demand.

Local Agriculture –

Economic Benefits and the Food Dollar

One of the key reasons for choosing to buy locally-produced food rather than imported food, is to foster economically viable farming businesses and farming communities in Nova Scotia. A recent Atlantic marketing study has shown that a strong majority of primary grocery shoppers identify supporting the local economy as a key benefit of purchasing local food products (CRA 2005:5). Studies have shown that the replacement of locally produced food by imports from outside a region or province transfers the financial benefits of that production activity to the region providing the imported product (Roberts et al 2005:2).

Nova Scotia is presently losing farms, along with the interwoven businesses that supply their inputs or process and distribute their products. Farm communities are unraveling. To keep the farms we have, encourage new farmers, and prevent the bleeding out of businesses that make up a local food system, a move to support local farms via our food dollar couldn't come fast enough.

In this section we examine the economic benefits to Nova Scotia that flow from local agriculture. Then we ask if buying locally-produced food actually helps farmers. A healthy food system should have benefits flowing in both directions.

Economic Benefits of Local Agriculture

Farm Business Activity—Direct Economic Benefits

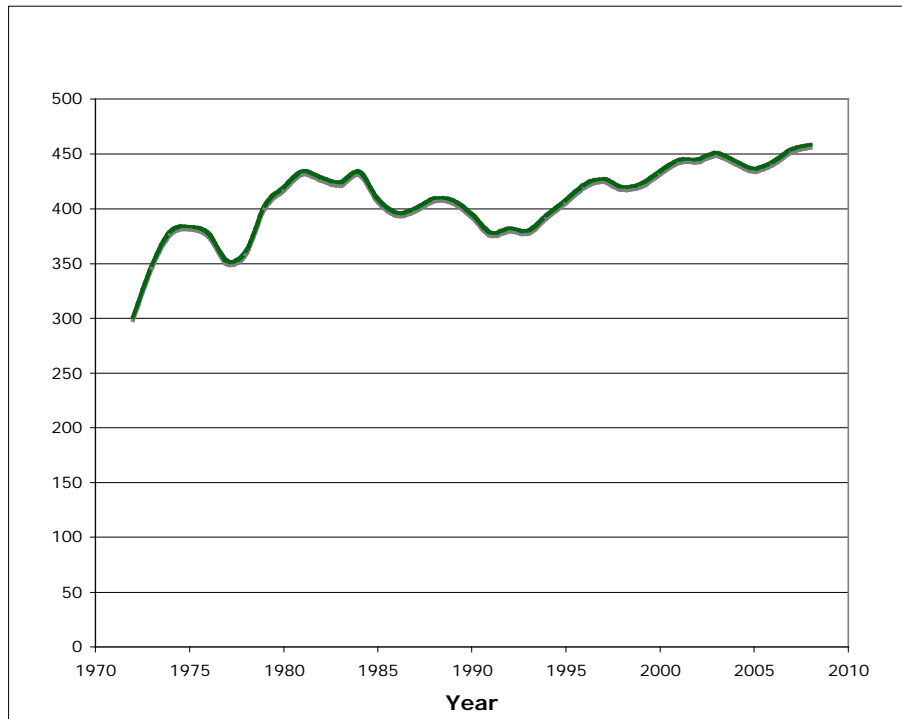
Farms generate economic activity in two direct ways—first by purchasing goods and services required for the production of farm products (upstream businesses), and second by producing farm products upon which other businesses (downstream) depend. For example, many food processors, retailers, warehouses, veterinarians, insurance companies, suppliers, mechanics, builders, accountants, machinists, and others depend on farmers for part or all of their business.

The direct business activity generated by farming can be tracked by looking at farm expenses. Farm expenses reflect the amount of money farmers are spending in order to keep farming. The operating expense figure can be used to approximate the amount of direct economic benefits farms are generating in their communities.

Figure 2 shows that farms in Nova Scotia are currently generating about \$460 million in business spending annually, and that these farm operating expenses grew by 31% between 1971 and 2008¹⁸. As we will see in the next section, the \$460 million in farm spending is an economic benefit that generates further benefits.

¹⁸ Statistics Canada. 2010. *Agriculture Economic Statistics*. CANSIM tables 002-0005. The 1971–2008 increases are calculated using the 1971–2008 trend line for averaging purposes: NS farms: $450-365/365*100 = \text{up } 31\%$.

Figure 2: Total Farm Operating Expenses, NS, 1971–2008 (Millions of \$2007)



Source: Derived from Statistics Canada. 2010. *Agriculture Economic Statistics*. CANSIM tables 002-0005.

Farm Business Activity—Indirect Economic Benefits

To analyze indirect economic benefits, the concept of a multiplier is useful.¹⁹ The money that farmers spend to run their farms contributes to the economy directly by generating demand for goods and services used as farm inputs. But there are also secondary benefits to this spending, since each farm-related business in turn generates further economic activity as a result of the revenues earned from business dealings with farms. A related question is: how much of the money spent by farms stays in the local economy, and how much leaves?

The wider (secondary) economic impact of Nova Scotia’s agriculture sector was estimated by ATi Consulting (2002:15) based on Statistics Canada data for 2000.²⁰ For every \$100 spent by Nova Scotia farmers in farm operating expenses, \$112 is generated in the agriculture sector of the provincial economy, and \$135 is generated in the agriculture sector of the Canadian economy, when direct, indirect, and induced benefits are combined. Thus within the agriculture sector alone (which includes food processing, farm machinery, fertilizer and seed, etc.), Nova Scotia farm activity has an expenditure

¹⁹ See the Glossary for more detailed information on the multiplier effect of economic activity.

²⁰ For a description of the ATi methodology, see “Input-Output Model” in the Glossary.

multiplier of 1.12 within Nova Scotia and 1.35 within Canada.²¹ These numbers are not additive, since the Canadian contribution includes the provincial one.

The available evidence indicates that most direct agriculture spending occurs within Nova Scotia, but the indirect and induced effects of that spending are higher outside the province than within, indicating that much of the benefit of agricultural business activity is leaking out of the province.

ATi Consulting (2002:18) also estimated the contribution of farms to the overall GDP. Using 1999 data and thus reporting in 1999 dollars,²² the report authors found that, although Nova Scotia agriculture contributes \$199 million *directly* to the provincial GDP, the *total* contribution to GDP in Nova Scotia is actually \$389 million when indirect and induced activities are factored in (a multiplier of 1.95). When these effects are factored in for the Canadian economy as a whole, the total economic contribution of Nova Scotia farming is \$853 million (a multiplier of 4.29). Thus for every \$100 direct contribution of agriculture to the GDP in Nova Scotia, a total of \$195 is actually added to the GDP in the province and \$429 is added to the national GDP.

Here is an example of how these funds are leaving. If a farmer buys a tractor from a Nova Scotia dealer, but if the dealer has bought that tractor from Ontario, only a small portion of the economic benefit (primarily the dealer margin) stays in Nova Scotia.

In a second example, if a farm hires a person to pick strawberries or milk cows, then that person will, in turn, spend a portion of his or her wages in the province, setting off a second round of spending. If that person buys groceries for \$100 at a locally owned store, then the store's margin is counted as a benefit to the local economy. If those groceries were sourced locally by the store, the local benefit increases. If they are sourced outside of the province, only the store's margin is counted as a benefit to the local economy. If the store itself is part of an externally owned chain and if most profits leave the province, then the local benefits are reduced proportionately. In estimating the provincial multiplier effect, several rounds of such spending are counted until there is no more provincially spent money to be counted (i.e., it has all "leaked" out of the province).

It is interesting to note that Nova Scotian agriculture produces more total GDP effect in the rest of Canada than within the province—with just 45% of the total economic contribution of Nova Scotia farming remaining within the province. In other words, after the farmer spends the money needed to operate his or her farm, most of it leaves the

²¹ These multiplier ratios are derived by dividing the total agriculture industry expenditures stemming from Nova Scotia farm operating expenses (direct, indirect, and induced) by the direct industry expenditures (365.87/327.10—in millions of dollars) for NS and (440.04/327.10) for Canada. For a discussion of "direct," "indirect," and "induced" expenditures, see "Input-Output Model" in the Glossary. Please note that the apparent discrepancy between the ATi numbers here and those used elsewhere in this report is due to the fact that the GPI calculations add depreciation charges to farm operating expenses, whereas ATi does not do so.

²² Note that, unlike figures in graphs and tables that have been converted to 2007 constant dollars, these numbers and those that follow from the ATi report are exactly as reported by ATi Consulting (2002) and are therefore in 1999 dollars, since the ATi study is based on 1999 data.

province because we do not have the businesses here to fully service our farms. A robust local food system would have more upstream and downstream businesses linked into our farms, allowing a higher percentage of farm spending to stay within the province.

A more recent Nova Scotia multiplier study (Roberts et al 2005) started with \$390.6 million in farm expenditures for the year 2004 (in 2004 dollars),²³ which does not include depreciation costs. According to their calculations \$390.6 million (2004\$) in annual farm expenditures generated:

- \$1.16 billion in gross spending, with \$339 million in indirect spending, and \$432 million in induced spending added to direct farm expenditures.
- An estimated 10,281 person years of employment, comprised of 6,600 direct full-time equivalent (FTE) person years of employment, 1,847 indirect FTE person years of employment, and 1,831 induced FTE person years of employment.
- A total contribution to Nova Scotia’s GDP of \$400 million that includes \$174 million in direct GDP, \$56.4 million in indirect GDP, and \$170 million in induced GDP. This is very similar to the \$389 million estimate of ATi Consulting, and thus produces a similar provincial multiplier (2.30 for 2004 compared to ATi’s 1.95 estimate for 1999).²⁴
- An estimated \$154 million in contributions to Federal and Provincial tax revenues, based on \$68 million in provincial and \$86 million in federal revenues (all in \$2004).

Surveys of farm spending habits indicate that farmers themselves try to support local businesses, even though these local impacts are gradually lost the further removed the indirect and induced effects are from the original farm spending. A 2001 survey of 333 farmers in Nova Scotia (ATi Consulting 2002) confirms that Nova Scotia farms have a strong local orientation as businesses. The ATi survey results, presented in Table 8, show that the majority of farm related expenditures are made locally (60%) and the vast majority provincially (92.5%), although the multiplier analysis discussed above shows that much of the indirect and induced economic benefit from these original expenditures is being experienced outside the province, as in the tractor example. Thus, many local farm supply businesses sell items to farmers that are not manufactured in Nova Scotia, so that a significant proportion of provincial demand actually stimulates manufacturing and other economic activity outside of the province.

Table 8. Farm Expenditures and Sales, Nova Scotia Farm Survey, 2001

	Farm Expenditures (%)	Farm Sales (%)

²³ Note that, unlike figures in graphs and tables that have been converted to 2007 constant dollars, these numbers and those that follow from the Roberts report are exactly as reported by Roberts (2005) and are therefore in 2004 dollars, since the Roberts study is based on 2004 data.

²⁴ Note that the actual dollar figures are not entirely comparable since the ATi estimate is in 1999 dollars and the Roberts one in 2004 dollars.

Outside NS	7.5	13.7
Within NS	92.5	86.3
Nearest Centre	60.2	48.0

Source: ATi Consulting 2002. *The Impact of Local Government on Farm Businesses in NS.*

Employment in NS agriculture

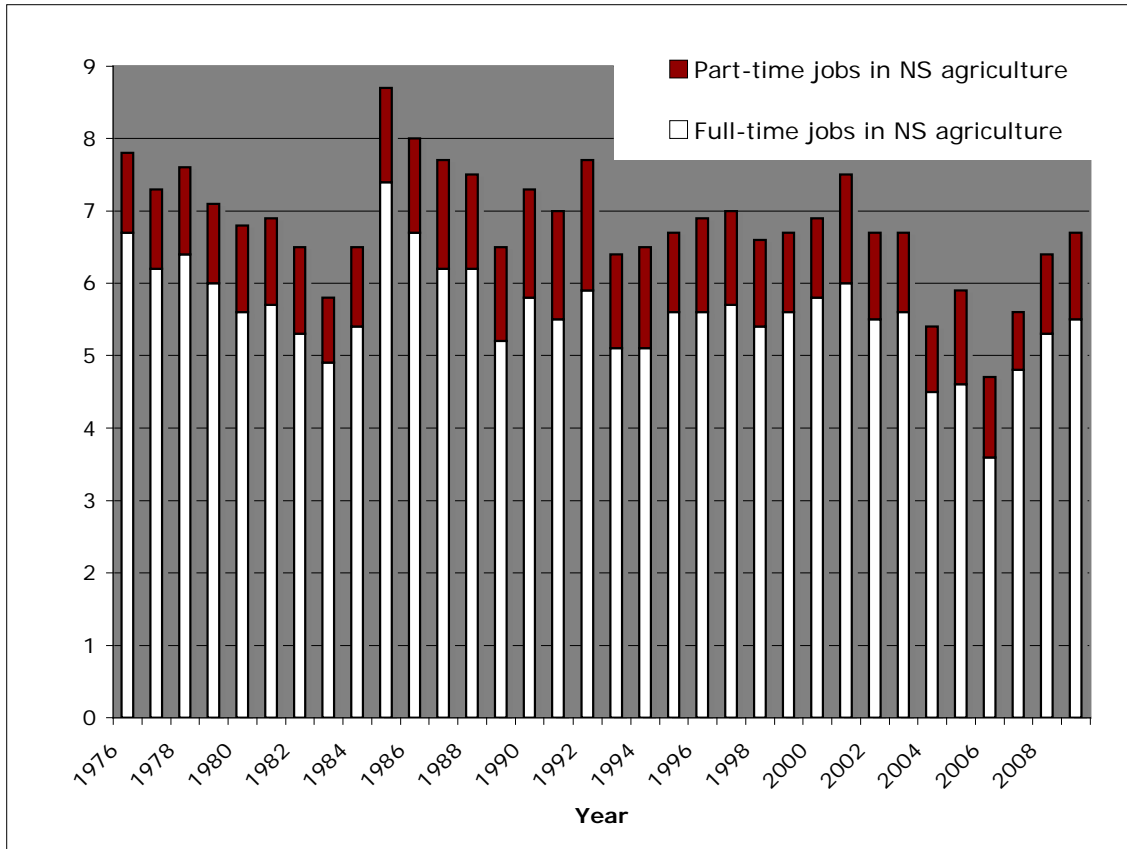
Nova Scotia agriculture is relatively labour-intensive, and generates a wide range of jobs on farms and in associated businesses. These jobs are created in rural areas where the level of unemployment is generally higher than the provincial average. The issue of on-farm labour by people from outside the province is not addressed in this report.

Direct employment

This is the number of people directly employed by farms in Nova Scotia. Most of these jobs in agriculture are full-time (Figure 3). As we lose farms, we lose jobs. But the converse is true, additional farms cause employment figures to rise.

In 2009 we had 5.5 thousand full-time jobs and 1.2 thousand part-time jobs. Employment in agriculture has risen since 2006, but it is too early to tell if this is a trend. Could the increase in demand for local food be a cause of this recent increase in employment?

Figure 3: Full- and Part-Time Jobs in Agriculture and Support Activities (thousands), NS, 1976–2008



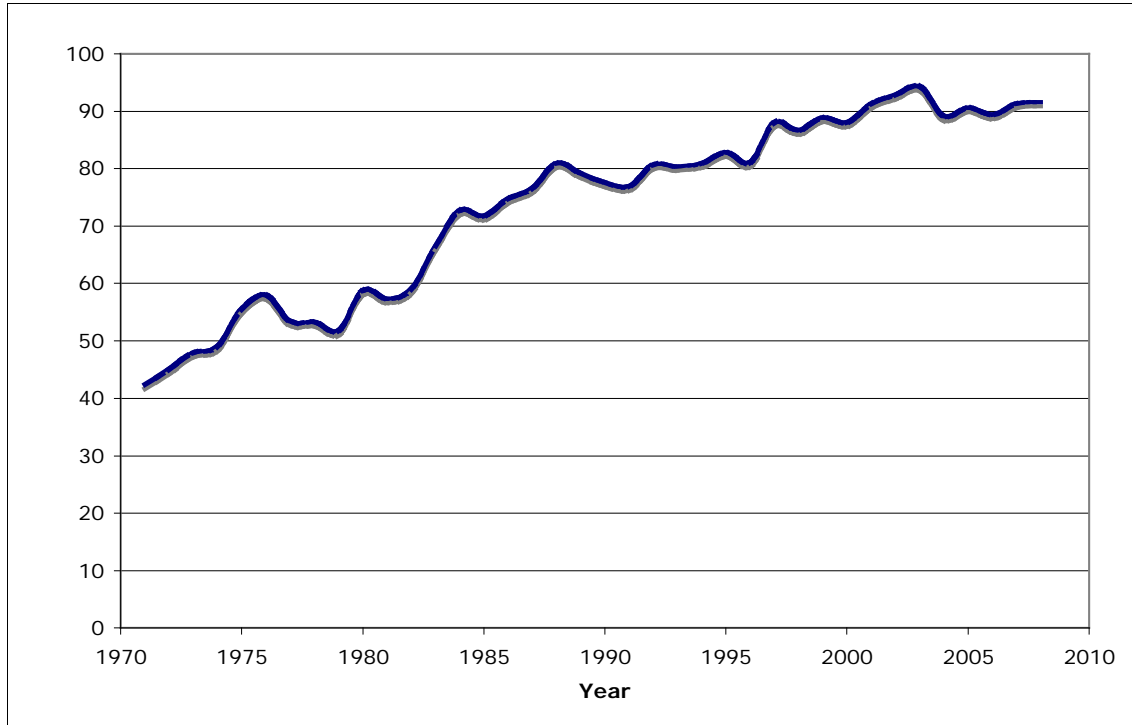
Source: Statistics Canada, 2010. CANSIM Table 282-0008. Labour force survey estimates by NAICS (1100-1129, 1151-1152), sex and age group. Last updated Jan 12 2010.

Farmers in Nova Scotia are spending roughly 90 million per year on wages (Figure 4). In the 37 years between 1971 and 2008, the amount spent on wages has doubled. Nova Scotia farmers spend more on wages than any of the other Atlantic provinces²⁵.

Figure 4: Amount Farmers Spend on Wages, NS, 1971-2008 (millions of \$2007)²⁶

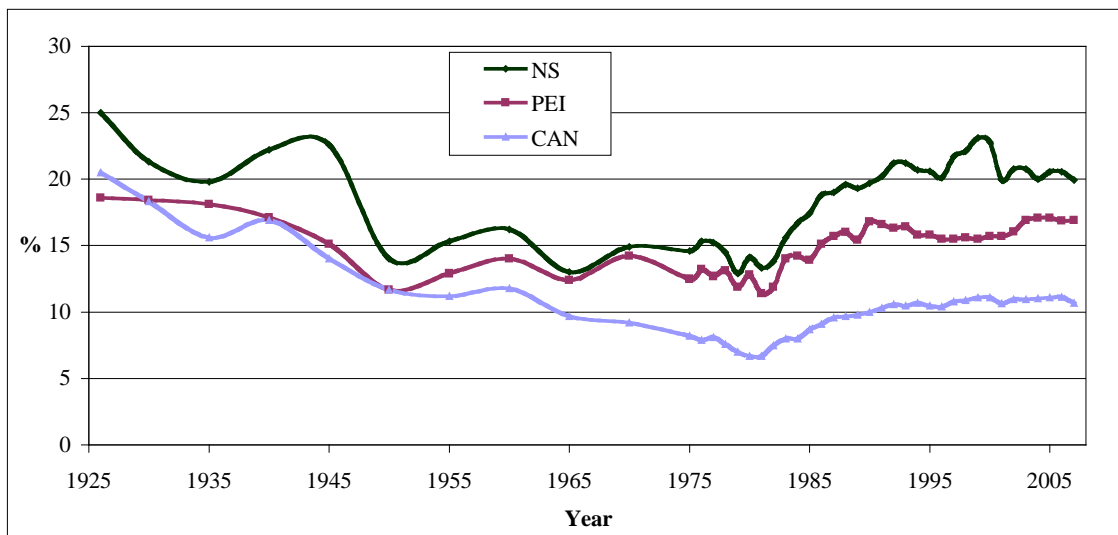
²⁵ Data not shown.

²⁶ Data from 1971-1985 are from Statistics Canada. *Farm Operating Expenses and Depreciation Charges*. Agriculture Economic Statistics. Cat. No. 21-012-XIE. Latest Update November 2009. Additional data is from CANSIM Table 002-0005: Farm operating expenses and depreciation charges; Cash wages including room and board, after rebates.



In Figure 5 we see that Nova Scotia farmers spend proportionately more on labour as a percentage of expenses than farms in other parts of Canada. This is likely due to the high degree of horticultural crops relative to the less labour-intensive field crops in our agricultural mix.

Figure 5: Ratio of Amount Spent on Wages (including Room and Board) to Total Expenses (including Depreciation) (%), Canada, PEI, and NS, 1925–2007²⁷



²⁷ Statistics Canada. *Agriculture Economic Statistics*. Cat 21-012-XIE. Latest update May 2008

Agriculture in Nova Scotia has been shown to be more labour-intensive than in other parts of Canada. According to Robinson and MacDonald (2000), the greater use of human resources in Nova Scotia may be a response to its lower cost (and greater dependability), as compared to other agricultural regions. They indicate that although Nova Scotia agriculture uses more *labour per output*, it is just as productive—if not more so—compared to other regions of the country. This illustrates the importance of considering broader definitions of productivity and efficiency than the narrow, conventional labour productivity definition of ‘output per hour’. According to Robinson and MacDonald (2000:3):

Hog producers in Nova Scotia for example achieve higher feed conversions and higher livestock productivity (pigs marketed per sow) as compared to their typical counterparts in the rest of Canada and the USA. These farms’ use of labour per unit of output, however, appears to be 15-20% higher. Dairy producers in Nova Scotia similarly achieve a higher output per cow but utilize more labour per hectolitre of milk shipped.

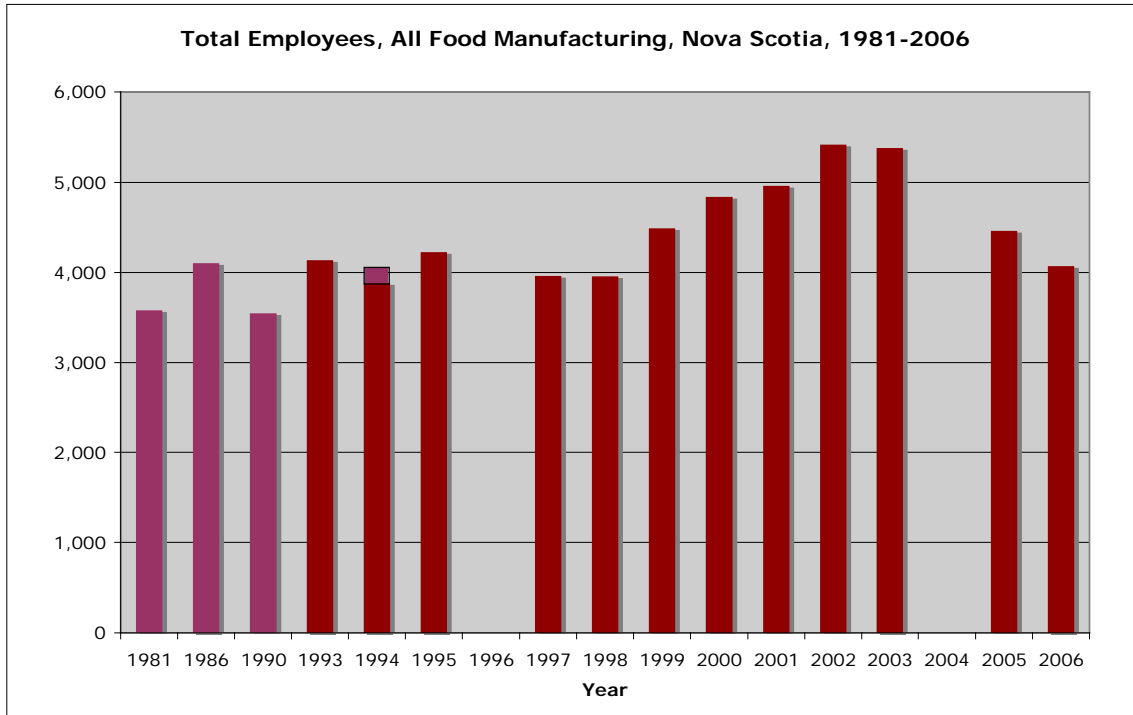
A PEI hog producer very simply illustrated the human contribution to productivity as follows, “The more time you spend with the pigs, the better they do. It’s a very obvious relationship” (Scott et al 2003). Unfortunately hog production, despite its efficiencies, has experienced a critical loss of producers and processing capacity in the region in recent years.

Despite this potentially valuable contribution of labour and human capital to productivity, producers often find it hard to get skilled and high quality help on their farms.

Total employment

In addition to direct employment, where farmers hire people to work for them, there is also *indirect employment*, where people are employed to work in food processing (Figures 6 to 8) or for farm supply businesses. When all those people spend their wages, this creates *induced employment*. When direct, indirect, and induced employment are added up, we call this *total employment*. All of the hours these people work, that are a result of agricultural activity, are summed, then divided by 2000 (50 weeks at 40 hours per week) to give us the total Person Years of Employment (PYE) for the sector. This gives us a picture of how many full time job equivalents are created by agriculture.

Figure 6: Employees in Food Manufacturing²⁸



²⁸ Beverage and 'other' categories are not included in the totals because of suppressed information. Also, not all employees are working full-time. Data is not available in all years. Source: Statistics Canada (red bars); NS Department of Finance Survey of Manufacturers (pink bars).

Figure 7: Food Processing Establishments²⁹

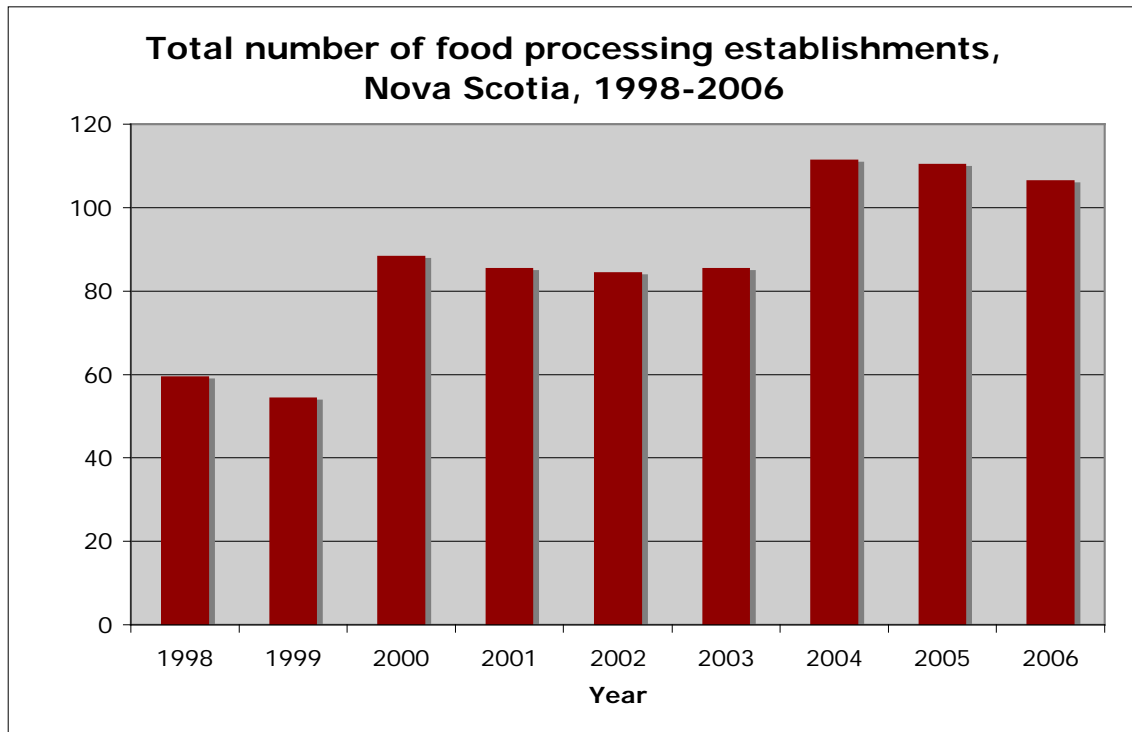
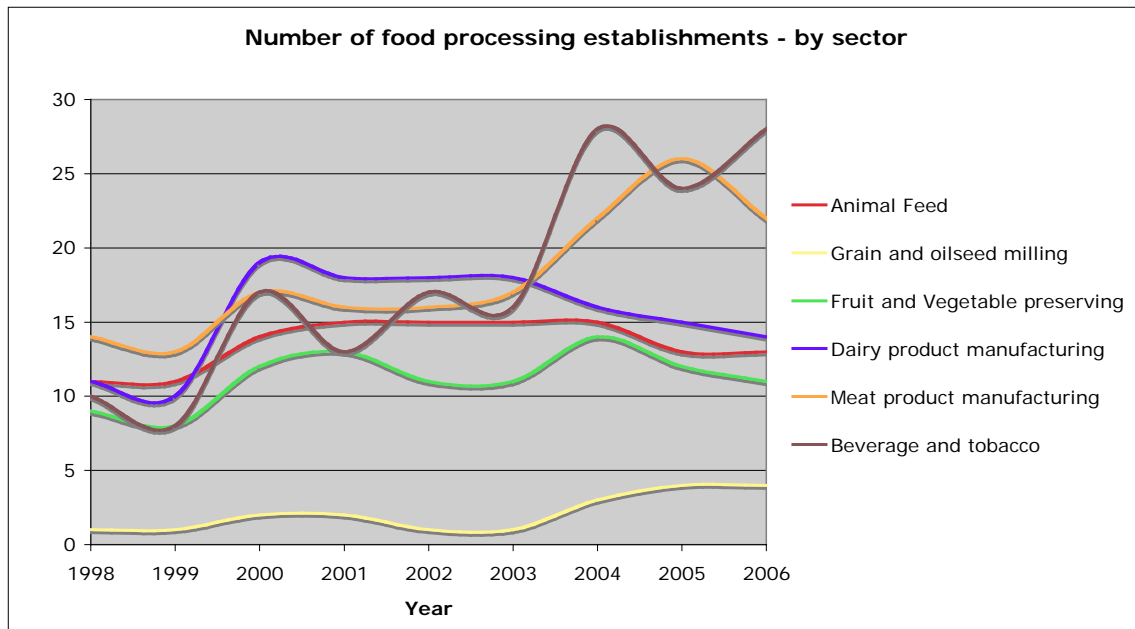


Figure 8: Food Processing Establishments in Nova Scotia, by Sector, 1998-2006³⁰



²⁹ Derived from Statistics Canada

³⁰ Derived from Statistics Canada

Studies were done to determine how many full time job equivalents are generated by agriculture in Nova Scotia. One study was done in 2002 by ATi Consulting, and the other in 2005 by Roberts et al 2005. Further details were provided by the Nova Scotia Department of Finance in 2007.

According to ATi Consulting, **NS agriculture created 6,300 direct Person Years of Employment (PYE) and 9,380 total PYE jobs in 2000.** In that year, total cash receipts were \$485,440,000. The employment per \$1,000 output was 0.0193 (the employment multiplier). With additional figures from the Department of Finance for that year, we determined the following employment multipliers:

- Greenhouse, Nursery, Floriculture: 0.0274
- Crop production: 0.0182
- Livestock production: 0.0199

According to Roberts et al. (2005), **in 2004, NS agriculture created 6,600 direct PYE and 10,281 total PYE jobs.** In that year total cash receipts were \$481,580,000. Therefore, employment per \$1,000 output generates a multiplier of 0.0213, which is higher than the one for the year 2000.

We can see in Table 9 that total agriculture employment (including direct, indirect, and induced) has gone down in the agriculture sector, except in the last year data is available (2004). Except for 2004, the employment *multiplier* has gone down over time, creating fewer jobs per \$1,000 of output. In 1979, for every \$1,000 of agricultural output, 0.06 person years of total employment are generated, for a grand total of 31,640 full-time equivalent jobs. By the year 2000, a similar output of agricultural products only generated 9,382 full-time equivalent jobs. It will be interesting to see if a more current total employment estimate would show an increase or a decrease relative to the 2004 estimate. We also want to know if increased consumer demand for locally-produced food will affect the multiplier and total employment positively.

Table 9: Nova Scotia Total Agriculture Employment (Direct, Indirect, and Induced)

Year	Total direct, indirect, and induced person years of employment ³¹	Employment Multiplier ³²
2004 ³³	10,281	0.0213
2000 ³⁴	9,382	0.0193
1996	11,800	0.0247

³¹ Total person years of employment amounts come from total cash receipts (from Statistics Canada CANSIM tables) adjusted for inflation, divided by 1000, and multiplied by the multiplier provided by the Department of Finance. These numbers may have to be changed if inflation adjustment is not necessary.

³² Except where otherwise stated, employment multipliers came from Fred Bergren, Nova Scotia Department of Finance December 2007

³³ Data for 2004 are from Roberts et al 2005.

³⁴ Data for 2000 are from ATi Consulting 2002. Their multiplier agrees with Department of Finance figures.

1990	14,239	0.0300
1984	22,142	0.0463
1979	31,640	0.0631

Unfortunately, there have been a number of significant food processing layoffs in Nova Scotia between 2004 and 2010 (see Box 1). The Maine Food Policy Working Group and Advisory Committee (2006:9) has noted a similar deterioration of Maine's food processing infrastructure both for agricultural and marine products over the past twenty years. This loss of infrastructure has reduced their ability to add value to local foods and similarly would reduce Nova Scotia's ability to tap into the recent interest among consumers in purchasing locally-produced and processed food.

Box 1: Job Loss in Agriculture Processing Sector

- 1) On March 26, 2010, Larsen Packers Ltd (owned by Maple Leaf Foods) stopped processing fresh pork. This resulted in the loss of about 40 jobs. It was the only remaining federally inspected hog-processing operation in the region.
<http://www.cbc.ca/canada/new-brunswick/story/2010/03/07/nb-larsen-hog-processing-farmers-102.html>
- 2) ACA Co-operative Limited laid off approximately 300 employees in January 2009 and closed its Eastern Protein Foods plant in Kentville. In December 2009, approximately 110 poultry workers at the New Minas plant were given layoff notices. ACA processes chicken and turkey under the Eden Valley brand.
<http://www.cbc.ca/canada/nova-scotia/story/2009/12/03/ns-aca-jobs-severance.html>
- 3) Maple Leaf Foods poultry plant located in Canard, NS closed in April 2007. It employed 380 people.
<http://www.thepoultrysite.com/poultrynews/10805/maple-leaf-foods-closing-poultry-plant-in-nova-scotia>
<http://www.canadianpoultrymag.com/content/view/917/38/>
- 4) Avon Foods, the last vegetable canning operation in Atlantic Canada, closed in 2004. The Avon Foods plant in Berwick used to employ 80 full time and 55 seasonal workers (DeLong, 2004).
- 5) For other closures in the food processing sector, see the 2007 Shunpiking article.
<http://www.shunpiking.com/ol0404/0404-AC-TSEB-maple4ever.htm>

Hypothetical estimates of employment effects if Nova Scotians were to eat more local food

Employment multipliers allow us to estimate how many PYE jobs are created with different farming scenarios. Please see the case studies for more detail.

○ **Beef**

For example, if we choose to eat locally produced beef instead of beef imported from outside the province, beef producers would generate at least \$90 million/year in cash receipts (compared with the \$22.5 million/year they generate now).

For every \$1,000 in cash receipts, the livestock sector creates 0.0199 jobs or 0.0213 depending on which reference used. So if cash receipts go up to \$90 million, this creates between 1,787 and 1,913 jobs.

○ **Sheep**

If we produced all the lamb we eat in this province, farm cash receipts could increase from \$2 million to \$10.7 million/year and employment would increase from 40 full year equivalent jobs to 213 full year equivalent jobs.

○ **Tomatoes**

Right now we eat 27.3 million kg of tomatoes, but we only produce 1.7 million kg. Therefore we import 25.6 million kg. This works out to about \$56.3 million³⁵ in potential income to local farmers if Nova Scotians switch to better-tasting locally-grown tomatoes. Since the employment benefits per \$1,000 of agricultural output is 0.0213 (Roberts et al 2005), eating 100% local tomatoes would create approximately 1,200 jobs. Similar estimates could be produced for other agricultural products.

Vermont Job Gap Study³⁶

This study by Hoffer & Kahler (2000) shows flows of money and goods into and out of Vermont, and estimates the job effects of substituting imports with local production. They acknowledge that globalization *can* represent an efficient allocation of resources. For instance, if production costs are lower in South Carolina or Mexico it will result in lower costs for the consumer in Vermont. While this may be true in narrow economic terms, the authors point to three important impacts that are left out of the picture: it ignores the external costs of production that are not reflected in the price at the cash register; there are measurable economic and fiscal impacts from dependence on imported goods and services; and finally, there are other values besides efficiency that are important to consumers in Vermont.

Regarding food, the authors conclude that **“If Vermont substituted local production for only ten percent of the food we import, it would result in \$376 million in new**

³⁵ At a low price of \$1/lb or \$2.20/kg. Most tomatoes are sold for more, which would generate additional income for farmers.

³⁶ <http://www.vtlivablewage.org/JOBGAP6a.pdf>

economic output, including \$69 million in personal earnings from 3,616 new jobs.” In the meantime, Vermont is a good state to compare with Nova Scotia with because of similar climate characteristics and sloping land. Vermont has a population of 623,908, which is less than Nova Scotia’s 935,573.

Michigan Eat Fresh and Grow Jobs Study³⁷

The Michigan Land Institute (2006) found that a determined effort to increase fresh market sales of Michigan fruits and vegetables could significantly boost employment and personal income across the state. Their report, *Eat Fresh and Grow Jobs* examines six different scenarios in which existing farmers double or triple the amount of fruits and vegetables they sell into fresh produce markets, such as wholesale grocery sales and farmers markets. Using an economic modeling tool customized to Michigan, they determined the shift could generate up to 1,889 new jobs across the state and \$187 million in new personal income.

This study’s projections could warrant an economic development investment of \$9.5 million toward marketing Michigan foods and helping farms and related businesses supply more fresh markets, a modest \$5,000 per potential job. Michigan’s 53,000 farms are poised to build more profitable businesses by responding to the fact that the state’s large population (8th in the nation) is seeking more fresh foods.

Farmers’ Share of the Food Dollar

In order for the economic benefits from local agriculture to continue to flow, we need to know how healthy the farming sector is. Will it be able to keep producing these benefits in the long-run? Our first question is how much of the food dollar spent in this province finds its way back to farms? The second question is how do we make the most of the food dollars spent so that farms, which are the foundation of the local food system, can thrive?

Farm production is integrally linked to both the inputs and the processing-distribution sectors of the food system. In recent decades, these sectors have taken a larger and larger chunk of the food dollar. In fact, most of the income generated from agriculture does not go to the farmer, but to other levels of the food chain.

For all products, including food, there is a difference between the price paid by the consumer and the price received by the producer. This difference, or margin, is added by wholesalers, retailers, taxes on products, and companies that transport the goods. According to Statistics Canada, margins accounted for 29% of food costs in 1964, whereas in 2004 they were responsible for 43%.³⁸ Some players in the food system are getting a bigger slice of the price than before. This means that other players -- likely farmers -- are getting a smaller slice.

³⁷ Available at: www.mlui.org. and www.LocalDifference.org (accessed June 2008).

³⁸ Statistics Canada 2009. Human Activity and the Environment: Annual Statistics. Cat. No. 16-201-X. p.22.

If we look at the amount Nova Scotians spend on food, and compare it to farm cash receipts for food in this province, we find farmers are taking in a declining share over time (Table 10). To estimate the proportion of food spending that finds its way back to farms in Nova Scotia, total farm cash receipts for food items were totaled and divided into total food spending. When Nova Scotians spent a dollar on food in 2008, at most 13 cents of that dollar went to Nova Scotia producers.

Table 10: Proportion of Food Spending that goes back to Farms, NS, 2008

Year	Total Estimated Food Spending In NS (thousands of \$) ³⁹	Total NS Farm Cash Receipts For Food ⁴⁰ (thousands of \$)	Total NS Farm Cash Receipts For Crops (thousands of \$)	Total NS Farm Cash Receipts For Livestock & Livestock Products (thousands of \$)	Farm Cash Receipts as a % of Food Spending ⁴¹
1997	1,746,579	298,403	62,856	235,547	17.1
1998	1,831,002	293,612	64,971	228,641	16.0
1999	1,837,253	310,295	80,465	229,830	16.9
2000	1,949,406	325,384	80,541	244,843	16.7
2001	2,006,850	326,775	64,226	262,549	16.3
2002	2,065,114	318,693	74,722	243,971	15.4
2003	2,190,928	326,704	89,174	237,530	14.9
2004	2,257,717	335,824	84,538	251,286	14.9
2005	2,353,486	341,070	84,825	256,245	14.5
2006	2,357,378	348,684	100,109	248,575	14.8
2007	2,542,456	342,295	79,510	262,785	13.5
2008	2,647,988	350,228	82,165	268,063	13.2

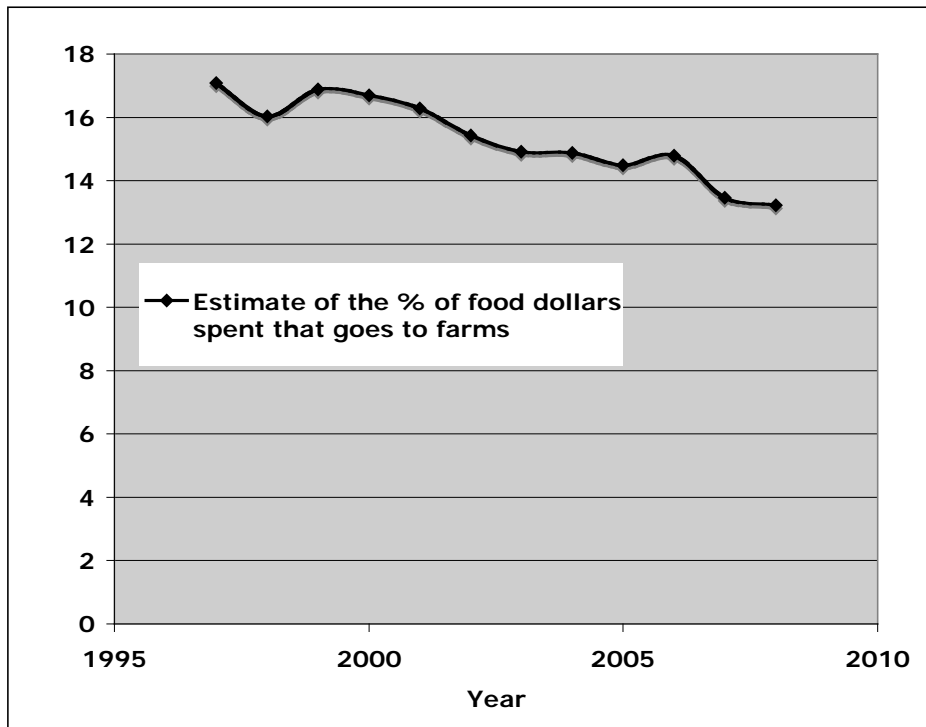
The last column is a high-end estimate because the total cash receipts for food might include some exported items of which the total value cannot be determined. **Farm cash receipts as a proportion of food spending** is an estimate of the proportion of our food dollar that goes back to Nova Scotia farms. It is declining. A longer time series than the one shown in Table 10 and Figure 9 would help us determine if the decline is a long term trend. If farmers got a larger slice of the food dollar – through better farm-gate prices, value-added products, and/or better market access – it would help to improve farm viability and encourage new entrants.

³⁹ Derived by multiplying average household spending on food by the estimated number of households reporting (Statistics Canada CANSIM table 203-0001).

⁴⁰ Derived by removing all non-food items such as furs, flowers, and Christmas trees from the table of Nova Scotia total farm cash receipts in Statistics Canada's Farm Cash Receipts – Agriculture Economic Statistics series. Cat. No. 21-011-X. Latest Update: May 2010. Amounts in the next two columns of the table are from the same source. To make this estimate more accurate, any remaining food items that are exported out of province would have to be removed. This appears to be impossible to accomplish at this time.

⁴¹ Total farm cash receipts (3rd column) divided by total amount spent on food (2nd column), and multiplied by 100 to get the percentage.

Figure 9: Estimate of the % of Food Dollars Spent in NS that Goes to Farms, 1997-2008⁴²



The pie chart in Figure 10 shows the proportion of the food dollar spent in 2008 that went to farms. Farms in Nova Scotia earned the equivalent of 8% of total food spending on supply managed products (dairy, poultry, & eggs). This is the lion’s share of the local food Nova Scotians are eating. Non-supply managed sectors such as vegetables and fruit, and red meat earned the equivalent of 3% and 2% of the food dollar, respectively.⁴³ Most of the food dollar – 87% -- is not going to Nova Scotia farms.

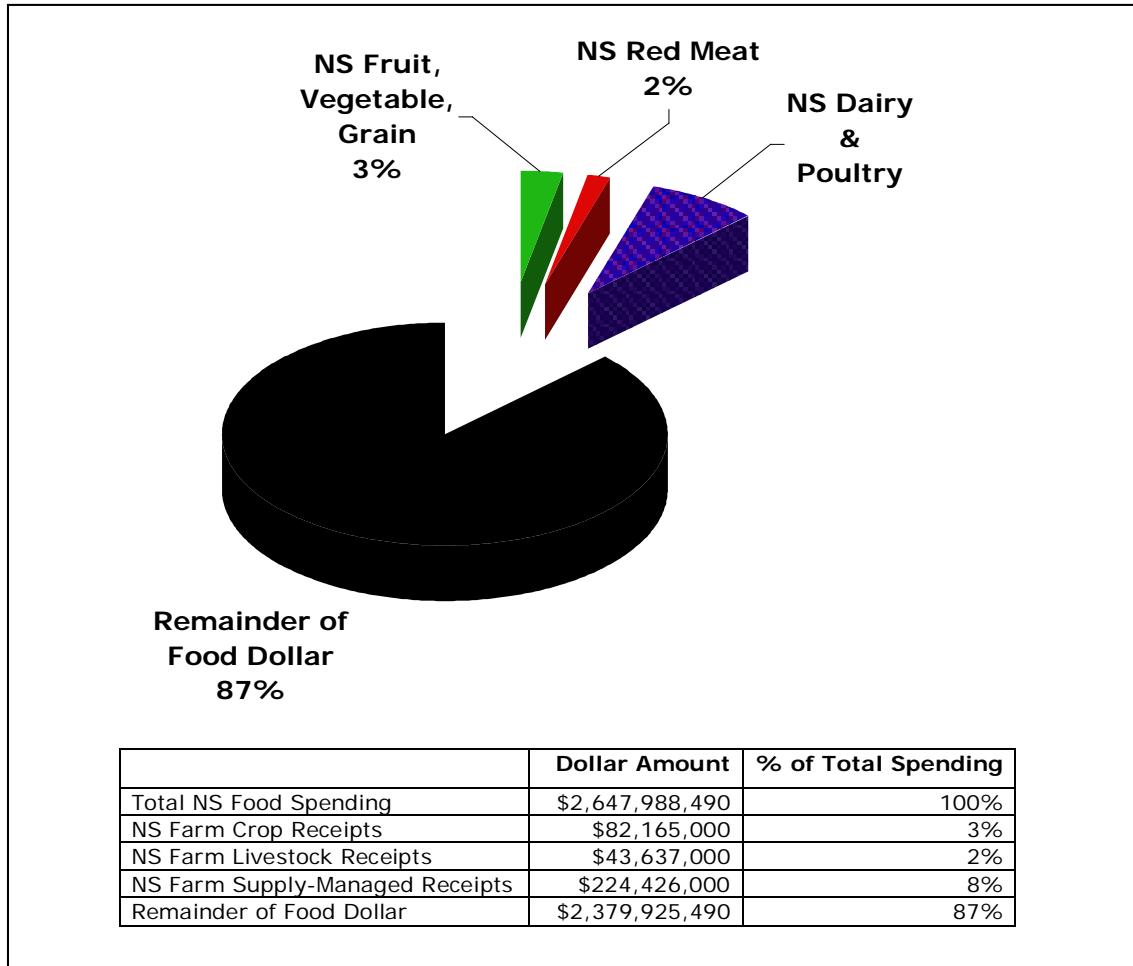
Any program that promotes the consumption of locally-produced food could track this proportion to assess their program’s success in convincing the public to support local producers. If farm cash receipts grow relative to food spending, this would indicate more consumers are choosing NS-grown product, or a higher percentage of their food spending is going to local growers, or local growers are capturing a greater share of the price of food.

Figure 10: Food Spending Relative to Farm Cash Receipts, Nova Scotia, 2008⁴⁴

⁴² See notes for Table 10 for details of the sources and calculations used.

⁴³ Again, 13% of the amount that is spent on food is a high estimate for the earnings of farms in this province. The estimate would have to be adjusted to account for international and interprovincial exports of livestock and crops.

⁴⁴ See notes for Table 10 for details of the sources and calculations used.



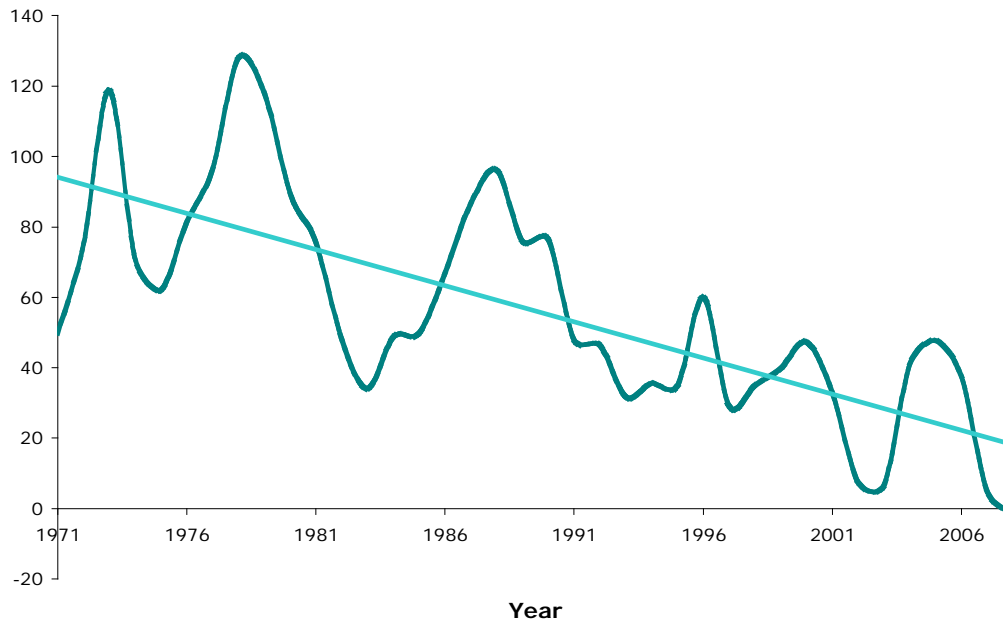
What does this estimate tell us?

Based on a survey of household spending conducted by Statistics Canada, about one million Nova Scotians spent about \$2.6 billion on food in 2008. If we take the estimated amount of farm cash receipts for food, at most 13% of the Nova Scotia food dollar was received by NS farms. Eleven years earlier, farm cash receipts were 17% of the food dollar spent. To have a healthy and robust food system in this province, it would be better to have at least 50% of the provincial food dollars spent find their way back to farms. This would mean that farm income from domestic food sales would be \$1.3 billion instead of the estimated \$350 million. If we multiply that by the employment multiplier from Roberts et al (2005), that would generate 16,285 full time equivalent jobs.

Once spending on food flows to farms, most of it flows back out again to pay for production expenses. Between 1971 and 2008, total farm cash receipts have gone up 11% in Nova Scotia, but the graph in Figure 11 shows that **over the same time, net farm income has gone down 80%. Even though total production has increased, farmers**

retain much less of that income. In 2008 farmers in Nova Scotia had *no* net income.⁴⁵

Figure 11: Total Net Farm Income, Nova Scotia, (\$2007), 1971-2008⁴⁶



If net income is close to, or below zero -- and it has been that way several times since 2000 --that means that on average, farmers are struggling financially. And we're not even counting all the potential costs in the determination of net income. These might include unpaid labour; the effects of stress; the disappointment of young family members not wanting to take over the farm business; loss of soil quality; and when farms fold, loss of community fabric that farmers tend to create.

Other estimates of the farmers' share

Manitoba study⁴⁷

In a Manitoba research project conducted in 2008, Keystone Agricultural Producers found that an average of only 27% of the cost of groceries goes back to the farm gate. That percentage ranged from 4% for grain products like bagels to 35% for dairy products like yogurt and cheese. Given that farmers' expenses and inputs account for about 86% of their revenue in Manitoba, not much of the money spent on food stays on the farm (KAP 2008).

NSFA study⁴⁸

⁴⁵ Total Farm Cash Receipts and Total Net Income data are derived from Statistics Canada's *Agriculture Economic Statistics* 21-603

⁴⁶ Derived from Statistics Canada's *Agriculture Economic Statistics* 21-603 and converted to current dollars.

⁴⁷ Keystone Agriculture Producers (KAP) August 26 2008 press release.

In 2009, the Nova Scotia Federation of Agriculture conducted a similar study to the one done by the Keystone Agricultural Producers discussed above. They compared market and retail prices for a list of foods. Retail prices were gathered at three different grocery stores (Sobey's, Superstore, and Co-op), and averaged. This was compared with the price farmers receive for those items. The farmers' share was derived by dividing the farmer's price by the retail price.

For vegetables and fruit, the farmer's share ranged from 5% for applesauce to 37% for parsnips. For beef, the farmer's share ranged from 7% to 23%, depending on the cut. For chicken, the farmer's share ranged from 9% for boneless, skinless breasts, to 28% for roasting turkeys. Eggs brought 70% of the food dollar back to the farm. Different pork cuts ranged from 12 to 14%. Lamb brought in between 27 and 42% depending on the cut. Dairy products ranged from 5 to 39%.

US estimate⁴⁹

In 1952, the farmer share of the consumer's food dollar was 40%, which slipped to 33% in 1962 and in 1997 was only 21%. Farm value is payment at the first point of sale and may include marketing charges such as grading and packing. Farm price is not equivalent to farm profit because it does not include any production input or pre-processing costs. A more recent estimate published by the Maine Food Policy Working Group⁵⁰ states that Maine consumers spend over \$3 billion on food products and services each year, and Maine farmers and fishermen receive less than 4% of that \$3 billion.

UK estimate⁵¹

A UK report shows similar results. When the food supply chain becomes more localized, a higher proportion of the financial and employment benefits find their way to the producer and the local area. Fifty years ago, UK farmers received 50 pence in every pound consumers spent on food; today they receive about 10 pence. The rest of the value is now captured upstream, mostly away from rural areas, by processors, distributors and global retailers.

Making the Most of our Food Dollars

Since farmers are the foundation of the local food system, and they seem to hold the least market power, there have been various attempts to increase their share of the food dollar. We will look at the price of food; the percentage of household expenditures spent on food; and finally various ways to use locally-directed spending to increase the farmers' share of the food dollar.

⁴⁸ Nova Scotia Federation of Agriculture March 18 2009 press release.

⁴⁹ Northeast Sustainable Agriculture Working Group. 2002. Northeast Farms to Food. Understanding Our Region's Food System. New England Small Farm Institute. Available from www.nesawg.org/pubs/farmstofood.pdf

⁵⁰ Maine Food Policy Working Group and Advisory Committee 2006

⁵¹ Jones 2001:8.

Price of food

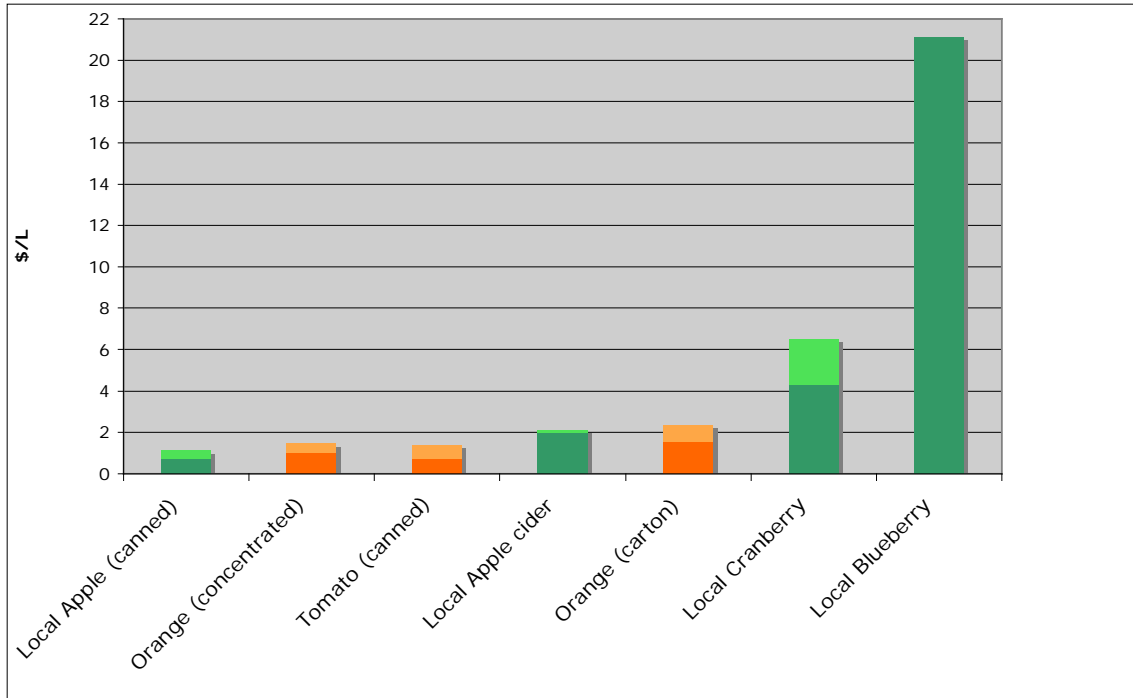
From the consumer's perspective, the price of food is often, but not always, of paramount importance. While some consumers will choose food products according to quality or location of production, most make choices based on the lowest price. (reference?)

On the other hand, farmers repeatedly say they don't get a fair price for their farm products (Scott & Colman 2008). It seems to be a matter of honour that farmers don't want to charge too much for the food they produce. But they need to charge enough to keep the farm going, and enough to attract young people into farming.

Attempts to direct food spending so that it benefits our farmers are often met with enthusiasm, but sometimes with claims to the effect of "local food is more expensive". **In truth, the type of food, degree of processing, convenience, and vendor has more effect on price than whether it is local or not.** In fact, if we had no local agriculture in Nova Scotia, the price of all food would likely go up. Roberts et al (2005: 15) studied prices of imported and local produce in Nova Scotia and Newfoundland and concluded that "local production means that consumers are getting a better price [for imported foods] when the local production comes to market." Consumers also get very low prices when local production peaks in the summer and autumn.

Figure 12 shows a comparison of price for different juices from a quick survey done in Nova Scotia grocery stores in November 2008. Green bars represent the price of locally-produced juice. Orange bars represent the price of imported juice. Juices are arranged from least to most expensive (left to right). The lighter-coloured bars on top of each bar show the difference between the least expensive option and the most expensive option. Locally-produced juices can be either the least expensive, or the most expensive, depending on the kind of juice.

Figure 12: Juice Prices per 1L, November 2008

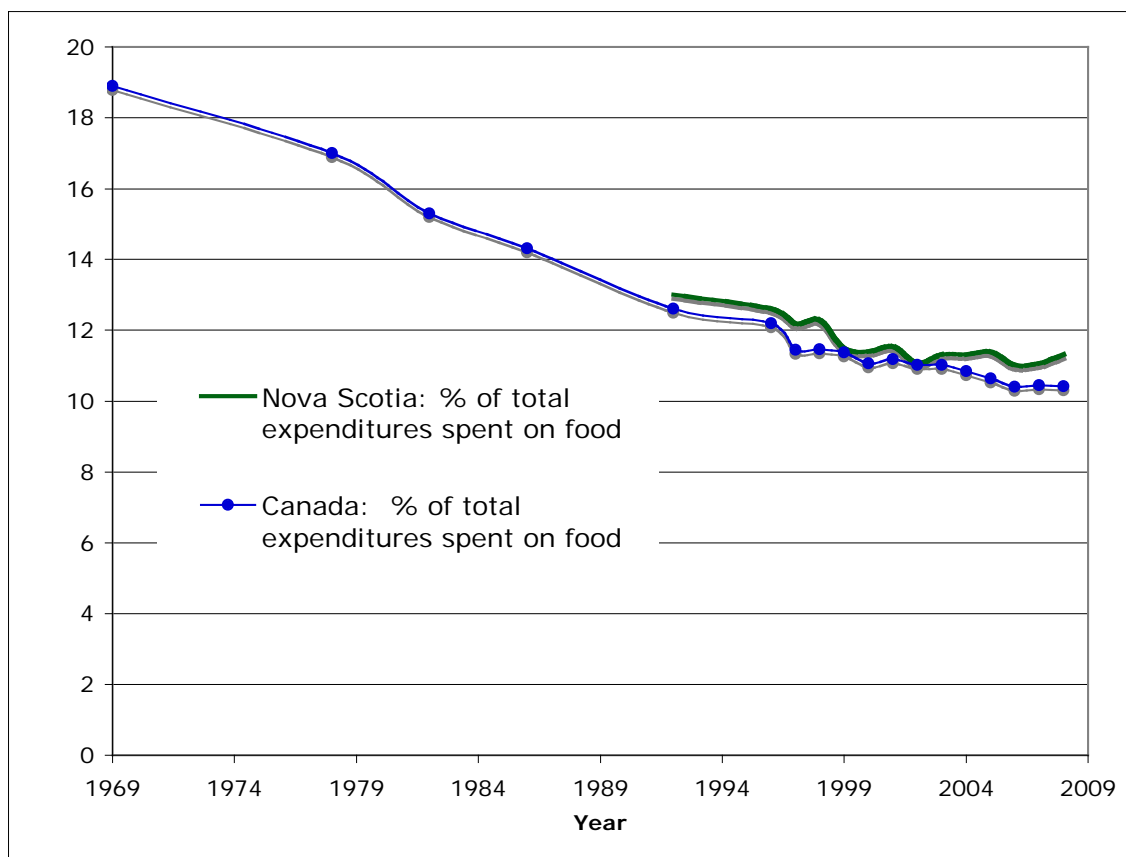


Percentage of income spent on food

Canadians spend proportionately less on food today than they did in the past. In 1913, in 60 cities, staple foods made up more than half a family's weekly budget. Since then, food has become relatively less expensive, and spending on other goods and services has increased (Statistics Canada 2009: 35).

Consider the *average proportion of household expenditures spent on food* (Figure 13). In 1969, Canadians spent an average of 19% of household expenditures on food, and now we spend an average of 10%. In Nova Scotia, the average is 11%.

Figure 13: Percent of Total Household Expenditures Spent on Food, Canada and Nova Scotia, 1969-2008



Source: Derived from Statistics Canada. 2008. Average household expenditures, by province and territory. Available at <http://www40.statcan.ca/101/cst01/famil16b.htm> and CANSIM table 203-0001 Survey of Household Spending, Average Expenditure.

Another way to look at food expenditure is as a *percentage of total income*, presented in Table 11, for various countries. In Canada, the average percentage of total income spent on food is 15%. In the graph above, the percentage of total household expenditures is close to 10%. The two numbers are different because *spending on food as a percentage of total household expenditures* is different from *spending on food as a percentage of total income*.

Table 11: International comparison of personal consumption expenditure on food, by country, 2005⁵²

Country	Spending of total income on food, %
Australia	17.3
Brazil	20.7
Canada	15.0
China	40.7
France	24.0
Mexico	27.3

⁵² Statistics Canada. 2009. Human Activity and the Environment: Annual Statistics. Cat 16-201-X, p.21

United Kingdom	19.0
USA	16.1

Source: Worldsalaries.org, 2008, Personal Consumption Expenditure – International Comparison, www.worldsalaries.org/personal-consumption-expenditure.shtml (accessed March 13, 2009).

Despite the different methods of deriving the estimate, the table and graph above show us that Canadians spend less of their total income on food than many other countries.

It appears that Canadians could stand to spend a little more of their income or household expenditure on food. However, this may not be true for low-income Canadians who would be spending a higher percentage of their income on food than the average Canadian. Given that many farmers are not making a living, spending more on food is worth consideration. Low incomes are a separate problem that should be dealt with in a focused way. A discussion on alleviating poverty is beyond the scope of this report. It is worth mentioning that it does not make sense to keep one group from making a living (farmers) in an attempt to feed another group that is also finding it hard to make ends meet.

The best ways to reduce a family’s cost of food are to

- buy directly from farmers
- buy in bulk
- buy farm products (eg potatoes) rather than convenience items (eg French fries)
- learn how to cook with less expensive cuts of meat

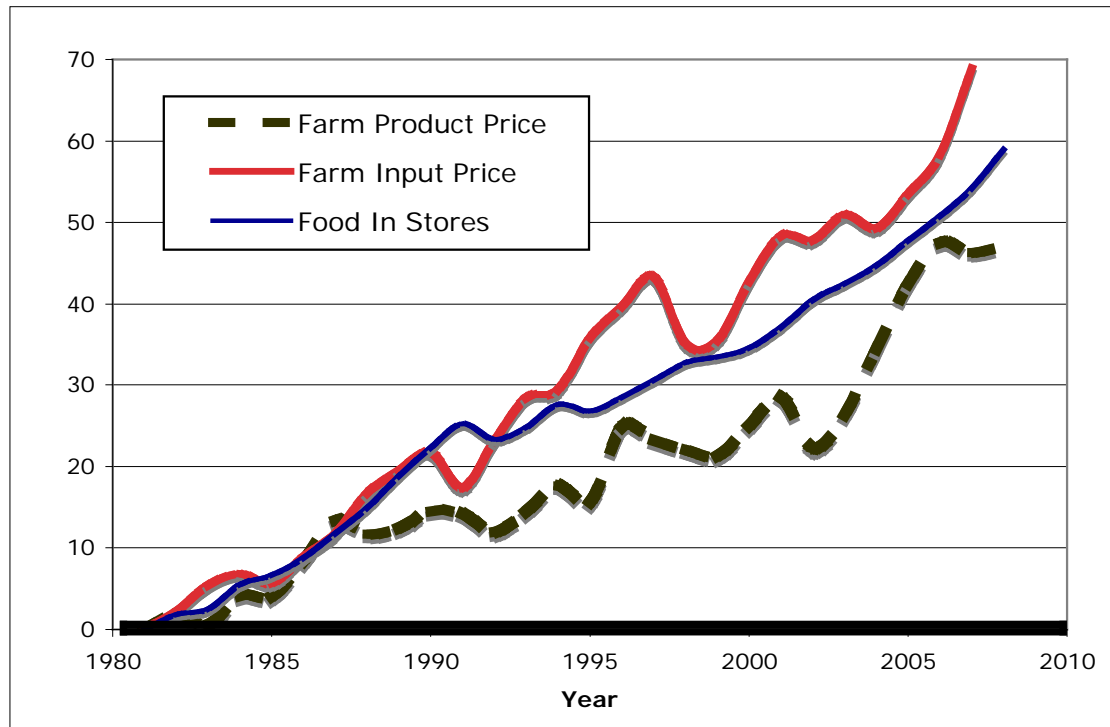
The worst way to reduce a family’s cost of food is to

- expect farmers to sell products for less than it costs to produce them

Farm Product Price

The essence of the problem is that farmers simply aren’t getting the prices they need to cover the rising costs of growing food. Input costs are high, while farm product prices are low. It is evident in Figure 14: the cost of farm inputs is rising much faster than the prices farmers get for their products. Farm wages in particular have shot up in the last 25 years and become a much larger portion of expenses. The cost of wages per farm rose steadily between 1980 and 2005 in Atlantic Canada. Farmers did not see any real increase in revenue during that time. Yes, food prices in stores are increasing – but the extra money paid by consumers is not reaching farmers. It’s being captured by farm suppliers and by food wholesalers and retailers. Farmers are going deeper into debt and having more trouble making payments (Scott & Colman 2008).

Figure 14: Price Index Change Over Time, NS, 1981-2008



Source: Derived from Statistics Canada's CANSIM tables 002-0022; 328-0014; and 326-0021.

There are a number of factors that influence farm product price. A few of them, including supply management; subsidies; uneven environmental standards; buyer consolidation and market power; as well as demand for local food are reviewed below.

- Supply Management

Most of the dairy and poultry we consume in Nova Scotia has been produced here because of a system of Supply Management. Supply and demand for these products are matched, and the price paid for these products is determined based on cost of production. The system is possible because imports are controlled. Supply management is very important to Nova Scotia agriculture and the rural economy because poultry and dairy products represent approximately half the farm gate income in this province and support substantial agri-business employment in processing and handling (Roberts et al 2006:2). The system is not perfect because of the cost of quota and the very high debt loads (Scott & Colman 2008), but there is a recognition that farmers need to be paid a fair price for their product and they need some protection from low-priced imports coming from areas with production advantages.

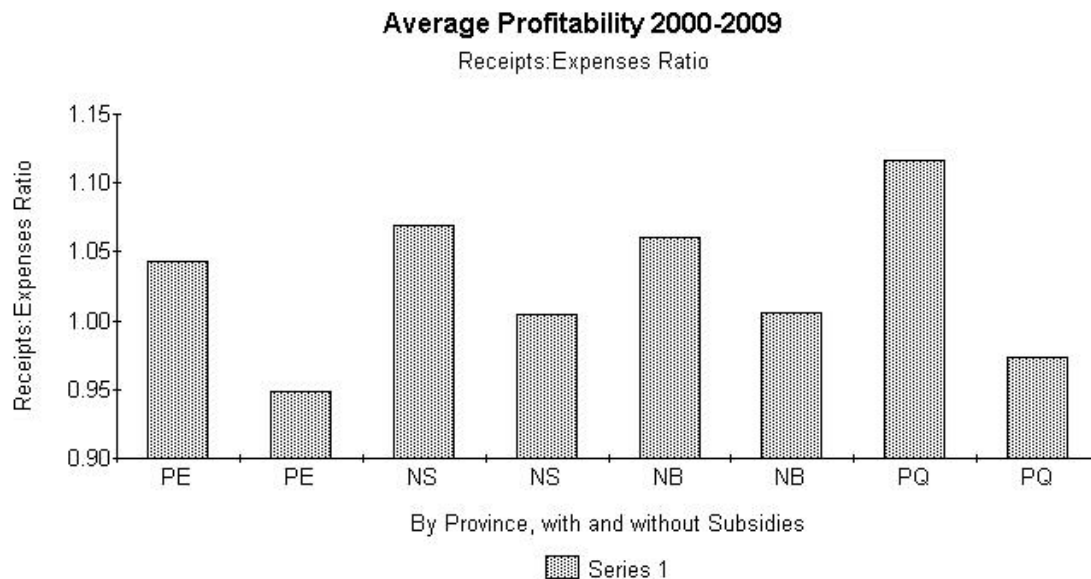
- Subsidies

Non-supply-managed sectors, like beef, pork, vegetable, and fruit, face the challenge of being price-takers (Roberts et al 2005:1). Their products must compete with the lowest import price (unless they differentiate their product in some way). United States and European farm subsidies drive prices down. "A 2000 report to the Ontario Federation of Agriculture's Task Force on Economic Renewal noted that for every \$1 of agriculture support spent by the Canadian Government, the US spends \$2.35 and the EU spends

\$2.65 in support of their farmers” (Roberts et al 2005:4).

A veteran vegetable farmer in the Annapolis Valley, who recently got out of vegetable production, said that a big reason vegetable farming is struggling in Nova Scotia is because of cheaper imports from heavily subsidized Quebec farms (John Lohr, *personal communication*). Cattle and hog farmers have similar accounts for their commodities. Figure 15 shows the difference in receipt to expense ratio for Maritime and Quebec farms. The first bar for each province is the ratio with subsidies, and the second bar is the ratio without subsidies. Quebec has a much higher rate of subsidies than the other provinces.

Figure 15: Average Profitability of Farms in Four Provinces, With and Without Subsidies⁵³



- Uneven Environmental Standards

Imported food may also be more cheaply produced than Nova Scotia products because our environmental standards are higher. “There is no verifiable system to ensure that imported foods are produced under the same rigorous environmental and food safety standards that have been adopted by Nova Scotia farmers in response to demands from various levels of the food chain” (Roberts et al 2005: 14).

- Buyer Consolidation and Market Power

Nova Scotia has only two major retail food buyers after a round of consolidation in the late 90s. Because of their size, they wield considerable market power which puts them in a good negotiating position with farmers (Roberts et al 2006:13). Farmers, on the other hand, must compete with all other growers to gain access to a market for their product. If

⁵³ This graph was provided by Denis Berube, in New Brunswick.

the retailer doesn't want to pay the price a farmer needs to cover his cost of production, the retailer can likely find product somewhere else at a better price. Farmers "believe that there are systemic problems with the present food chain that has forced them to accept prices lower than they would face in a less consolidated food system. They argue that the changes in food chain structure due to its control by one or two processors and two retail giants make it very difficult for a diversified agricultural industry to meet volume and other requirements of these processors and retailers" (Roberts et al 2005:14).

Nova Scotia's retailers and processors are now being challenged by even less traditional food delivery systems, such as Wal-Mart (Roberts et al 2005:16). "The specialized food retailers and processors are responding to this new competition by further consolidating the food supply chain to gain every economy of scale available so that they can compete with these new low-cost, high-volume outlets. Nova Scotia farmers now have to deliver their product to fewer collection points, often farther away, and in a form that frequently adds additional packaging or other costs to the primary producer" (Roberts et al 2005: 16-17).

"Nova Scotia agriculture maintained a reasonable level of profitability for many years within the context of a more diversified industry. However; the producer was closer to the consumer at that time. The processing, wholesaling and retailing sectors were less consolidated and producers could often sell their product to individual grocery stores. The competition for that supply was further away from Nova Scotia than it is now in terms of the distance that it is feasible to transport food" (Roberts et al 2005:17).

- Demand for Local Food

When consumers go into stores and make requests, store managers notice. In the summer of 2008 and 2009, there was a spike in consumer requests for local products in Annapolis Valley grocery stores.⁵⁴ Richard Melvin, a vegetable farmer in the Annapolis Valley mentioned in April 2008 that with the increased enthusiasm for locally-produced food, he was finding that retailers were more enthusiastic about buying his product. When asked if he was getting a better price for his product, he responded that the prices were getting a bit better, but they weren't yet at the point where the farm can cover costs and be sustainable (Richard Melvin, *personal communication*). More needs to be done to ensure that the benefits that result from a local food system get back to the farmers.

Domestic Fair Trade

An Atlantic Canadian farming organization notes (Cooper Institute 2008) that there is occasionally a gap that exists between "buying local" and supporting a food system that is economically sustainable. This organization addressed the need for an economically sustainable food system by making an agreement with a retailer that guaranteed fair returns to both the producer and the retailer. Unfortunately, over time, the retailer challenged the returns, demanding a greater margin. This particular organization decided that, without a fair return, their agreement was no longer fair trade. In this case, the

⁵⁴ See as an example, <http://www.novanewsnow.com/Environment/2008-08-08/article-589605/Concerned-citizens-rally-at-Sobeys-in-support-of-local-produce/1>

retailer did not respect the principles of Domestic Fair Trade, resulting in the termination of the agreement. This experience was very discouraging for the organization involved.

Fair trade shouldn't have to be a 'brand', or an 'initiative'. It should be regular practice.

Through the years, co-ops, marketing boards (supply management), organic certification, direct marketing, and domestic fair trade –are all attempts by farmers to get a fair price for their product. None have been perfect. All have required a tremendous amount of work to accomplish. Whenever any additional margin is established in the food system, the players with the most market power generally try to capture it.

At the Growing Opportunities conference put on by the Nova Scotia Department of Agriculture in March 25-26 2008, a chef from Yale University was invited to talk about his University's efforts to get more locally-produced food on the menu of the dining halls. John Turenne described the 'open-book policy' where he opened the accounting system for the dining hall budget and asked the farmers and distributors to do the same. Together they figured out how each player could get a fair return.

If these 'open-book' and 'fair return' policies were applied to the Nova Scotia food system, farmers' returns would almost double (Roberts et al 2005: 5-6).⁵⁵

At Dalhousie University, the dining halls decided to eliminate trays. As a result, students were not able to carry as much food from the buffet to the tables. The amount of wasted food plummeted and they were able to save a considerable amount from the food budget. It remains to be seen if those savings will be passed on to the farmer.

Sustainable Seattle Study

Consumers have the opportunity to make their food dollars do brilliant work in their communities. The Sustainable Seattle Study studied the effect of locally-directed spending on community economic benefits. They identified businesses that were part of the Local Food Economy (LFE) and compared them with regular food businesses (Sonntag 2008). The report describes the dollar flows and economic linkages of food-related businesses. The analysis shows that **locally directed spending by consumers more than doubles the amount of money circulating among businesses in the community**. This means that a shift of 20% of the food dollars into locally directed spending would result in a nearly half billion dollar annual income increase in King County alone and twice that in the Central Puget Sound region. Their multiplier study⁵⁶ showed:

⁵⁵ "Agriculture and Agri-Food Canada studies of performance in the food retailing and processing sectors found that [the processing and retail] part of the food value chain received average operating returns on long-term capital assets from 1990 through 1998 of 12.15% and 12.60%, respectively. A study of manufacturing and retail sectors through 2004 indicated that returns to those sectors were in line with those through the 1990s. Applying equivalent measures to the Nova Scotia agricultural industry 2001 census data indicates that farmers would have received an additional \$91 million in operating income, compared to reported operating income of \$93.7 million, almost doubling NS farm income if they had received such similar returns to the rest of the food value chain" (Roberts et al 2005).

⁵⁶ Using different methodology from Roberts et al 2005 and ATi 2002.

For every \$100 spent at your average grocery store ...

\$25 – or 20% – is re-spent locally for a total impact of \$125.

For every \$100 spent at a local food economy grocery ...

\$52 – or 34% – is re-spent locally for a total impact of \$152.

For every \$100 spent at farmers market ...

\$62 – or 38% – is re-spent locally for a total impact of \$162.

For every \$100 spent at your average restaurant ...

\$31 – or 24% – is re-spent locally for a total impact of \$131.

For every \$100 spent at an local food economy restaurant ...

\$79 – or 44% – is re-spent locally for a total impact of \$179.

While these amounts cannot be directly used to show the effects of locally-directed spending in this province, the study shows significant benefits associated with making the choice to ‘buy local’. Again, the question is whether the benefits will be distributed in a way that recognizes the contribution of the farmer.

Direct Marketing

Direct marketing is selling directly from farmer to customer through road-side stands, on-farm stores, Community Supported Agriculture groups, direct sales to restaurants, or farmers’ markets. A recent report by Roberts et al (2008) on direct marketing in the Atlantic region estimated that direct market sales of agri-food products amounted to \$91 million per year. Study authors also found that direct marketing, as a portion of the Nova Scotia food system, is on the rise. Using input-output models, total economic impact of the estimated \$91 million was conservatively predicted to be:

- 2,177 person years of direct and spin-off employment within Atlantic Canada.
- \$23.3 million in direct and spin-off wages and salaries (household income) within Atlantic Canada.
- \$67.7 million in Atlantic Canadian GDP (at market prices).
- \$4.1 million in Atlantic Canadian direct and spin-off provincial tax revenue.
- \$6.1 million in Atlantic Canadian direct and spin-off federal tax revenue.

While it is obvious from this report that economic spin-off benefits from the direct marketing are significant, it does not assess whether the farmer is getting a more significant portion of the food dollars being spent. We could assume that by cutting out the ‘middle man’, such as the wholesaler or the retailer, farmers *are* getting a better portion of the food dollar. It would be good to confirm whether this is true, and what share of the food dollar they are getting. A study of redundant trade in California did find that when local farmers market their products in the global food system, they receive \$0.09 on each dollar the consumer spends on food. The remaining \$0.91 did not stay

within the local economy. Alternatively, local farmers involved in direct marketing receive between \$0.80 and \$0.90 on each dollar the consumer spends on food (International Society for Ecology and Culture, 2004 cited in Miedema 2006)

In the US, between 1994 and 2008, approximately 200 new farmers markets have started each year for the past 14 years, more than doubling the number in operation nationwide.⁵⁷

Consumer Behaviour

This chapter has detailed the benefits of having a local agriculture system in Nova Scotia. Replacing imported food with locally grown or raised items would be a good thing for healthy rural economies. But will consumers be willing to preferentially buy locally-produced food? This is a question addressed in an Atlantic Canada Food Consumer Study prepared for the Council of Atlantic Premiers (CRA 2005). The study was based on telephone interviews conducted with Atlantic Canadians who are the primary grocery shoppers for their household. A total of 1602 interviews were completed (CRA 2005:1). The study makes several conclusions:

- Consumers find it difficult to identify locally produced food products (poor labeling; lack of information) (p.3). In addition, lack of availability was the most common reason given for not purchasing local products (p.25)
- Survey results show that knowing an item is locally produced is “not a sufficiently compelling reason” for consumers to choose it. These shoppers need to know that a locally produced food product is “as good as, or better than, what they are currently buying in terms of taste and quality.” Pricing should be at least comparable to food products produced elsewhere. (p.3)
- Only 20% of respondents consider being locally produced to be critically important. (p.4)
- Taste and quality are more important to consumers than where a product is from. (p.4 and 7)

Shoppers are somewhat aware of the benefits of locally-produced food:

- Shoppers are well aware of the contribution of local products to their provincial economy (p.5).
- A significant minority of primary grocery shoppers believe products grown locally utilize fewer chemicals or pesticide sprays as compared to products grown elsewhere (p.6).
- “When asked to compare locally produced foods to those grown or produced

⁵⁷ United States Department of Agriculture, Agricultural Marketing Service, “Wholesale and farmers markets—Farmers market growth, 1994-2008” (accessed 4 March 2009 from <http://www.ams.usda.gov>)

elsewhere across a range of evaluation criteria, consumers are most likely to consider locally produced products to be better in terms of taste, followed by being grown in an environmentally responsible fashion, and nutritional content.” (p.5)

- Survey results suggest grocery shoppers are willing to consider purchasing local food products, even if they sometimes are marginally more expensive than their regular brands. (p.3)
- Local farmers are identified as *the most credible group* to endorse or promote local food products. Three in ten view grocery stores as credible endorsers, while two in ten would pay attention to a health expert or doctor. (p.4)

Finally, the survey found that any change in purchase behaviour will most likely come from within the large grocery chains:

- Sobeys and Loblaws (Superstore) will need to be on side if consumers are to try something new. Store flyers and in-store specials are the most effective tools for convincing grocery shoppers to purchase food items they normally would not buy. (p.3)

Conclusions and Recommendations

It is clear that having a local food system produces multiple benefits for the rural economies of Nova Scotia, as well as the province as a whole (Table 12). Agriculture creates real wealth – products are grown or raised from our natural resources, and from there are consumed or further processed. These food products generate jobs for a wide variety of people, and they provide meals for us to enjoy.

Table 12: Summary Table - Economic Benefits of Local Agriculture

Nova Scotia Agriculture	Economic Benefit
Direct annual farm spending	\$460 million in farm operating expenses (2008) ⁵⁸
Gross annual farm spending: direct, indirect, and induced effect of farm spending	\$1.16 billion (2004 estimate) ⁵⁹
Total annual employment: direct, indirect, and induced employment from farming activity	10,281 full time equivalent jobs (2004 estimate) ⁶⁰
Total annual contribution to GDP: direct,	\$400 million (2004 estimate) ⁶¹

⁵⁸ Statistics Canada, for the year 2008, adjusted to \$2007 dollars.

⁵⁹ Estimate in 2004 (\$2004 dollars), Roberts et al 2005.

⁶⁰ Estimate in 2004, Roberts et al 2005.

⁶¹ Estimate in 2004 (\$2004 dollars), Roberts et al 2005.

indirect, and induced GDP	
Annual contributions to Federal and Provincial Tax revenues	\$154 million (2004 estimate) ⁶²
Eating local beef instead of imported beef	Increase annual farm cash receipts by at least \$67.5 million and increase employment in the sector to 1,900 jobs
Eating local lamb instead of imported lamb	Increase annual farm cash receipts by at least \$8.7 million and increase employment in the sector to 213 jobs
If Vermont substituted local production for only ten percent of the food they import	\$376 million in new economic output, including \$69 million in personal earnings from 3,616 new jobs (2000 estimate) ⁶³

We can see in Table 12 that if Vermont substituted some of its imported food with locally produced items, significant economic benefits would result. It is likely that Nova Scotia would see similar gains.

While the work of farmers creates economic benefits for all of us, we need to make sure that those benefits extend back to farmers. They have experienced very poor economic returns in recent years. These poor returns and high debt loads have coincided with a deliberate distancing between consumers and farmers. Farmers are asked to produce larger bulk quantities, deliver food to more distant warehouses, and follow more stringent environmental and food safety protocols, without being compensated for their extra efforts. Farmers have to negotiate with buyers who are further away in central Canadian head offices, and who have increasing market power as grocery chains amalgamate. Farmers have to compete with other growers around the world, many of whom do not have to adhere to the similar protocols or follow our labour laws.

It is a good thing for farmers to follow labour laws and be good stewards of the resources they use, but it is not reasonable for them to need to use up their equity and take off-farm jobs just to keep the farm going. Organic certification and the associated price premiums is one way for farmers to reclaim the extra costs associated with stewardship (an externality⁶⁴). Another example is charging a deposit on drink containers to encourage and pay for the costs associated with recycling (an externality).

Consumers benefit from Nova Scotia farmers who follow environmental farm plans and nutrient management plans. Although costs are higher and yields potentially lower, the consumer does not pay more for the products produced in this more sustainable manner. In Europe, governments compensate farmers directly for this work. “The Swiss model specifically compensates for the increased work load to maintain an environmentally

⁶² Estimate in 2004 (\$2004 dollars), Roberts et al 2005.

⁶³ Hoffer & Kahler 2000: <http://www.vtlivablewage.org/JOBGAP6a.pdf>

⁶⁴ Externalities are costs or benefits associated with a product or service that are not paid for by the person buying that product or service. An example of a positive externality is when a producer pays extra to protect a water course on his farm, but doesn't include that cost in determining the price of his products. An example of a negative externality is when truck traffic damages the highway surface, but the trucking company is not charged for this damage and in the end the public pays for the highway maintenance.

compliant operation and for the reduced crop yields resulting from maintaining these standards” (Roberts et al 2005:27). Farmers are compensated for a 12% drop in yield for integrated systems and 17% drop in yield for organic systems. Ideally, these percentages could be incorporated into the price of products.

The true and real cost of producing food should be reflected in the returns paid to the producer. This is where all costs and benefits should be accounted for and recognized. If organic growers can do it, at least for the environmental stewardship costs and benefits, we should be able to find ways to internalize more of the externalities into the prices of goods. This helps us make good and informed decisions in the marketplace. Food prices should not be lowered because of skewed market power, or uneven subsidies, or policies. Prices should only go down when true innovation and efficiencies are realized.

It would be ironic if – just as we recognize how beneficial local agriculture can be – we lose our farmers because we have not been willing to compensate them adequately for their efforts. Benefits have to flow back to farmers for them to keep generating wealth for society.

To that end, Table 13 shows the share of the food dollars we spend that go back to the farmer. It shows that over time, farmers are getting a dwindling share of that food dollar that coincides with their dwindling market power. But we do see that engaging in direct marketing (see the last line in the table) can be one strategy for reclaiming more of the food dollar for the farm.

Table 13: Summary Table -- Share of the Food Dollar that goes to Farms

Estimate of the share of a food dollar spent that goes back to farms		Year
Nova Scotia	15.4%	2008
US⁶⁵	21%	1997
	33%	1962
	40%	1952
UK⁶⁶	10%	2001
	50%	1950
California⁶⁷	- Global food system	9%
	- Direct marketing	80-90%
		2004
		2004

We can think of the price of a food item as a pie, and imagine that while the farmer is getting a smaller and slice of that pie, the other players in the food system are getting

⁶⁵ Northeast Sustainable Agriculture Working Group. 2002. Northeast Farms to Food. Understanding Our Region’s Food System. New England Small Farm Institute. Available from www.nesawg.org/pubs/farmstofood.pdf

⁶⁶ Jones 2001

⁶⁷ Miedema 2006

bigger slices. Processors, retailers, advertisers, wholesalers, and transport companies have a bigger role to play in food systems that are focused on global sourcing. Local food systems, where consumers are closer to producers, have more opportunity to make sure the farmer gets a fair slice of the price pie. We see in Table 14 that our society is, on average, over time, paying a smaller share of our household expenditures on food. We also see that in Canada, we are paying a smaller share of our total income on food relative to other countries.

Table 14: Summary Table - Spending on Food

Average proportion of household expenditures		
Country or province	Year	%
Canada	1969	19%
Canada	2006	10%
Nova Scotia	2006	11%
Average proportion of total income		
Country	%	
Australia	17.3	
Brazil	20.7	
Canada	15.0	
China	40.7	
France	24.0	
Mexico	27.3	
United Kingdom	19.0	
USA	16.1	

This indicates that there is room to pay farmers more for what they produce. If we make sure that our food dollars are spent wisely, those dollars can work for us, increasing wealth in our communities. Table 15 shows the benefits of directing spending on businesses that support local farmers in Washington State.

Table 15: Summary Table - Stretching our Food Dollars⁶⁸

For every \$100 spent	% re-spent locally	Total impact
At your average grocery store	20%	\$125
At a local food economy grocery store	34%	\$152
At a farmers' market	38%	\$162
At your average restaurant	24%	\$131
At a local economy restaurant	44%	\$179

⁶⁸ Sustainable Seattle Study, Sonntag (2008).

Setting Targets

It is interesting to compare the agriculture situation in Maine and Nova Scotia (Table 16). Maine has a 40% higher population, 35% more farmland, 35% higher annual total expenditure on food, 21% higher gross farm sales, and 111% more farms than Nova Scotia. The Maine Food Policy Working Group has determined that less than 4% of the food dollar spent in the State goes back to farmers (methodology not shown) (Maine Food Policy Working Group and Advisory Committee 2006), whereas in Nova Scotia we have estimated that 13% of the amount spent on food goes back to farms. Likely our higher food dollar going back to farms is connected to our supply managed dairy and poultry sectors. However, Maine has set a target to raise this percentage to 20% by 2020 (Maine Food Policy Working Group and Advisory Committee 2006), and Nova Scotia has no target.

Table 16: Comparison of Maine and Nova Scotia Agriculture

	Maine ⁶⁹	Nova Scotia ⁷⁰
Total population (2009)	1,318,301 ⁷¹	940,397 ⁷²
Total farmland (ha)	545,341 ⁷³	403,044
Gross farm sales (2006 for Maine and 2007 for NS)	\$553 million	\$458 million
Number of farms	8,000 ⁷⁴	3,795
Share of food eaten that is produced within the state or province	20%	We don't know
Goal for share of food eaten that is produced within the state or province	80% (of calories consumed) by 2020	No goal
Annual total expenditure on food	Over \$3 billion	\$2.3 billion
Share of food dollar that goes to farmers (estimate)	Less than 4%	13%
Goal for share of food dollar that goes to farmers	20% by 2020	No goal

Maine has also explicitly supported a food system that⁷⁵

- “Promotes a fair return to all participants, provides entrepreneurial freedom and allows access to opportunity to participate in the food supply system”;
- “Increases food self-reliance through increasing production of food in Maine and increasing the consumption of Maine produced fish and farm products”; and
- “Is recognized as a vital sector of the Maine economy, enhances rural economic development and contributes positively to Maine’s rural quality of life.”

Nova Scotia should measure and set a target for the share of food purchased that is produced locally. The Maine Food Policy Working Group and Advisory Committee

⁶⁹ Unless otherwise noted, statistics are from Maine Food Policy Working Group and Advisory Committee 2006

⁷⁰ Unless otherwise noted, statistics for Nova Scotia come from this chapter or Statistics Canada.

⁷¹ USDA Economic Research Service <http://www.ers.usda.gov/statefacts/ME.htm#FC>

⁷² Statistics Canada. Quarterly Demographic Estimates. <http://www.statcan.gc.ca/daily-quotidien/091223/t091223b2-eng.htm>

⁷³ USDA Economic Research Service <http://www.ers.usda.gov/statefacts/ME.htm#FC>

⁷⁴ USDA Economic Research Service <http://www.ers.usda.gov/statefacts/ME.htm#FC>

⁷⁵ Maine Food Policy Working Group and Advisory Committee 2006, #7, #8, and #9.

(2006) has set a target of 80% by 2020, which could also be adopted by Nova Scotia. Nova Scotia should measure and set a target for the share of the food dollars spent in the province that go back to farms. Increasing the share by 2-3% per year would be a good start.

In Nova Scotia our agriculture is uniquely suited to producing food for the local, or at least the regional market. Our farms can produce a wide variety of products – from lamb to peaches. The more focus we place on the local market, the more innovation will happen in season-extending techniques. According to Roberts et al (2006:10) our farmers are diversified and accustomed to changes to their production system (e.g. adding different crops, adapting new crops to Nova Scotia). Building up a local food system will bring challenges. Loss of farms, loss of skilled farmers, and loss of agricultural infrastructure will make it hard to increase production quickly. However, with clear goals, adequate returns to farmers, and an enthusiastic consumer base, it will be possible to start replacing imported items with locally-produced ones.

The issue of food price will emerge again in the next chapters of this report. Identifying externalities – those costs and benefits that are not counted in the cost of production – will help us to understand the real costs and benefits of local agriculture.

Local Agriculture –

Social Benefits and the Food Community

Consumers are often unaware of the environmental, social and economic impact of the products that they purchase and are not only physically but also 'psychologically' distanced from their food.

- Andy Jones, Eating Oil: Food Supply in a Changing Climate, 2001:5

The current food system emphasizes imported food over locally-produced food. This has minimal social benefits and many costs. One could argue that imported food provides greater variety for less money than it would cost to grow or raise it here. The economies of scale from large agri-business in the global food system brings us unlimited supply supposedly at the cheapest price possible. Here we need to distinguish between price and value. Does importing most of our food bring us better value? Is the price we pay covering all the social costs associated with displacing our family farms, and loss of farm culture? Is the money we spend giving us vital and nutritious food, or is it going into advertising, corporate profits, transport, packaging, and preservatives? In a scenario where most of our food is produced in this region, we could still have the variety that imports bring, but also discover the variety of foods we can grow here while at the same time supporting our farmers. The social benefits of a local food system could be the most important reason for buying locally-produced food.

Social benefits and costs are the most difficult to measure and put a value on, yet they are likely the most important. We make bad decisions when we buy food because we are not aware of all the ways our spending habits affect people and community life. In cases when we *are* aware, we make much better, if seemingly 'irrational' decisions. For instance, we might want lettuce and see two choices in front of us. One is a lettuce mix in a box from California for \$5.99, and the other is a mix from a farmer down the road for \$8.00, both 454 grams (1lb). You know the farmer down the road is in the volunteer fire department and unlike most other volunteers, can attend to calls in the community during the day. You know he has 3 children in the local elementary school; he helped put a new roof on the church; coaches baseball; and used his tractor to pull you out of the ditch last winter. You know that the California product is grown on mega-farms with subsidized water for irrigation; poorly paid labour; and extra chemicals for crop protection. You know it was transported on subsidized roads by refrigerated truck from California, in plastic boxes that have to be recycled in Nova Scotia. You know that in the time it takes to transport the greens here, 60% of the vitamin C is lost.

Knowing the social circumstances surrounding a product can affect our food-buying decisions. But we don't know those circumstances. In fact, it is important that we know as little as possible for the global food system to work. It is very difficult to go into a grocery store and figure out where products are from (CRA 2005:3). As the gap between consumers and producers widens and our ignorance of food production grows, we will make poorer decisions while spending our food dollars.

Here is the crux of the issue. Where lowest price is most important, the consumer will choose the least expensive lettuce mix, given equal superficial quality features. Where family and community are most important, other factors come into the decision. The problem is that the community farms will continue to provide social benefits even if we choose to buy the imported products. We only feel the loss once the local farms are gone, and by then it is far too late to change our shopping cart decisions.

Nova Scotia's agriculture is showing signs of unraveling. When farming families are reluctant to have their children take over the farm, this is a serious sign of distress. Our dependence on food imported from distant places has grown enormously while our local food system is suffering. The social and economic fabric that sustains local agriculture, that nurtures and teaches new farmers, that maintains the resilience and viability of agriculture communities, and that makes barter and co-operative arrangements possible, has begun to tear (Scott & Colman 2008).

Benefits of agricultural activity in this province are reviewed below. Some comments from farmers are included from interviews done in 2003 (Scott et al 2003) or from other sources. These benefits are divided loosely into benefits for rural communities, benefits for people and relationships, and province-wide benefits. Finally, there will be a discussion of how to incorporate social benefits into the price of food.

Benefits for Rural Communities

In many parts of Nova Scotia, farming is the foundation of rural communities. Without farms, rural communities would be very different places, and many of the communities we have now would not even exist. The fact that we *have* rural communities is a benefit. In this section some of the more tangible social benefits are included, such as employment, stability and durability, as well as infrastructure benefits.

Employment

Employment is a significant benefit of sourcing food locally. Imported food may provide some transport, distribution, and retail employment benefits, but far less than an equal amount of locally produced food would. *Local* food generates the many additional employment benefits associated with *production* of food here. Scott & Colman (2008) show that agriculture is an important employment generator with a significant multiplier effect. In particular, agriculture creates employment in rural areas where unemployment is generally higher than in urban areas. The evidence examined indicates that agriculture not only creates direct employment on farms, but also generates jobs in a wide range of farm-related upstream businesses (veterinarians, equipment dealers, mechanics, feed and crop supply businesses, etc.) and downstream businesses (food processors, transportation, retailers, etc). As well, farms provide on-the-job training in a wide range of skills that contribute significant benefits both in the workplace and beyond (such as practical problem-solving skills applicable in many spheres of daily life). In addition to skills, farms can develop an incredible work ethic in children. Not every child, and not every farm is successful in this regard, but children who grow up on a farm with jobs to do and

a sense of purpose--as well as family members who are good role models--are more likely to have a good work ethic (Scott et al 2003). This is something employers are very keen to have in their employees, and farm kids are in demand for that reason. Farms are also special because they develop and nurture entrepreneurial skills in the population. This kind of business savvy is hard to teach in a college, for instance. Farms create opportunities for people to try out all kinds of business ideas and develop them to full-blown new businesses. Even children start businesses and learn important management, production, and promotion skills at a young age. For more detail on the economic benefits of agricultural employment, please see the chapter on economic benefits.

Stability and durability

Economic benefits from agriculture are significant because they occur in rural areas and they are relatively stable and durable compared with other rural industries (Roberts et al 2005:13). “Because most of this provincial benefit occurs in rural areas, the contribution to economic activity within Nova Scotia that can be credited to agriculture is significant. For many areas of Nova Scotia, the relative stability of this economic engine has insulated rural economies against the fluctuations experienced in other industries (e.g. fisheries, forestry, tourism). Even when farm revenues decrease, expenditures are relatively fixed by the requirements of production systems so that the economic activity from those expenditures is comparatively stable even though revenue may be volatile from year to year.”

Durable or resilient economies have the ability to move through change or stress and to recover effectively from it. It by no means denotes resistance to change or carrying old patterns and structures into a future in which outdated structures may no longer be appropriate or relevant. On the contrary, analysts have noted that times of stress or ‘crisis’ may often actually constitute opportunities to move towards a better future—even if those opportunities may not seem apparent at the time.

One example is the BSE (bovine spongiform encephalopathy or “mad cow”) crisis in 2003, when the U.S. closed its border to exports of Canadian beef after a cow in Alberta died of the disease. Canadian consumers, however, responded by eating more Canadian beef (Jeanne Cruikshank, *pers.com*, January 21 2008), indicating that resilience could actually be enhanced by the longer-term development of a favourable market infrastructure for local beef.

In Vermont, Bill McKibben (2007: 231)⁷⁶ has argued that localized economies based on the community-based agriculture path will be needed both to reduce the progression and impact of climate chaos, and to deal with its effects. In an era of escalating energy prices and increasingly scarce fossil fuel, McKibben argues that communities will be better off in relatively self-reliant regions. And if there is wilder weather, prolonged and more frequent drought episodes, and more extreme storm activity, as predicted by climatologists, he notes that imported food supplies may become more unreliable and

⁷⁶ These two paragraphs draw from Scott & Colman 2008.

insecure, and that there will be major advantages to being part of a more durable local and regional economy.

For all these reasons, he argues, we need to rebuild our local economies. McKibben acknowledges that this path may not yield the same quantities of foodstuffs as highly industrialized and centralized systems of production and may grow less quickly. But he argues they would be more durable, secure, and reliable in the longer term, and would produce richer relationships and better quality products.

Maintenance of rural infrastructure

The presence of working farms in rural Nova Scotia helps a great deal with the maintenance of rural infrastructure. A dense network of farms keeps machinery dealers, veterinarians, farm supply, gas stations, and processing businesses open. All of these businesses have employees who live in rural areas and populate the local schools, or maintain other facilities. Without farms it would be much more challenging for people to live and work in rural areas.

Benefits for people and relationships

During interviews with farm people (Scott et al 2003) and in numerous conversations since then, it has become obvious that farming contributes significantly to the development of community-minded people. It is difficult to pin down exactly why that is, but it could be a function of a dense network of farms where cash is scarce and people manage by helping each other out. Everyone knows that at some point, they are going to need help, so they need to stay open about helping others when they ask – or even when they don't. In this section stories help to illustrate the benefits. In order to fully understand it, one has to *live* it. As farming communities become less dense, and as fewer people actually farm, we will have a harder and harder time understanding what it is that farming contributes. Our society (and even our farms) has become so much more dependent on transactions with money where we hire people to mind our kids, or install security systems, or buy every piece of machinery needed – instead of depending on friends, neighbours, and family to watch out for us and share the load. Reciprocity, of course, is part of the deal. In this section farming culture, social capital, mutual reliance, relationship-based economic activity, and trust are the headings chosen to help describe the social benefits of farming that are so challenging *to* describe and measure, and as a result often don't get counted or acknowledged.

Farming culture

Without a local food system, we would lose our farming culture. Farming in the Maritimes is often characterized by celebrations of many kinds, including kitchen parties, barn dances, community suppers, exhibitions, harvest festivals, and the activities of folk schools.

Social capital

Scott & Colman (2008) document the contribution of the farming community to ‘social capital’ in Nova Scotia and PEI.⁷⁷ For example the vast amounts of unpaid hours allocated by farm families to developing and maintaining community organizations. In addition, a significant contribution has been detailed in the form of *heritage* and continuity, since farmers are very often the ones in rural communities most likely to stay in one place, often for generations. In an increasingly mobile world with less connection to place, farmers’ connection to land provides their community with ‘anchors’: people who know the history; who understand the dynamics of their particular community’s relations and its strengths and weaknesses; who stick around and make the community ‘tick’ so to speak. This ‘anchoring’ quality can be useful when a community needs to manage resources (either individual or common), because the knowledge of a community’s heritage that comes with continuity helps to avoid mistakes, and helps build effectively on what has been accomplished in the past.

Conventional economists measure prosperity by the number and market value of the things we buy and sell. But an inventory of ‘social capital’ raises the possibility that prosperity may also be highly dependent on both the number and quality of *connections* that we have and make with each other—including both barter and banter; social support networks; sharing of equipment, services, time, and effort; co-operation on many levels—from economic activities to working together on community projects; and the creation and maintenance of a ‘community of care’, where people are ‘careholders’ as well as shareholders.

The relationships that comprise strong social fabric are a contribution from the farm community to the wider community. And it is this strong social fabric that will help to, in turn, build a local food system. They are mutually reinforcing. To build a relationship-based economic system, relationships are needed. And for a renewed local food system to be built, those relationships need to be expanded and strengthened. Farmers’ Markets, farm stores, and CSAs are providing some opportunity to expand and strengthen that relationship, but more are needed. Bridges need to be built between farm and non-farm populations, between generations, and between people who don’t normally socialize with each other. The evidence also indicates that, in general, bridge building between farm and non-farm populations requires a certain threshold level of farm people relative to total population.

As farms in a community are lost, living conditions become increasingly difficult both for the remaining farmers and for farm-related and non-farm enterprises and organizations. Even though each farm is operated independently, there is an understanding among farm people that they need and depend on each other for practical and moral support, advice, help at critical times, borrowing equipment, custom work, a political ‘voice’, and more.

⁷⁷ This section on social capital draws heavily on Scott & Colman (2008): 218-231.

Farms require a supporting infrastructure, which becomes less viable as there are fewer farms.

Unlike many workers who leave their homes to go elsewhere to work, farmers remain on their land and therefore in their communities through the day, thus act as an ever-present physical anchor for their communities. According to a PEI farmer: “The farmers are the workers in the community. They are foundation people in the churches and fire departments and exhibitions. As you lose the farmer, other community activities are lost too” (Scott et al. 2003).

It is not surprising that Lyson et al. (2001) showed rural communities in the U.S. with ample numbers of family farms had more economically independent people, more civically motivated people, and greater community viability than communities without the density of such family farms.

Mutual reliance

The farm community is associated with people helping each other out. In other words, farm people have a particularly high volunteer rate and rate of mutual reliance and support – another huge social benefit of local food.⁷⁸

Two specifically farm-related organizations, the Women’s Institute (WI) and 4-H, contribute significantly to community culture in farming communities and both rely largely on volunteers. In Nova Scotia, the first WI branches were formed in 1913. Since then, WI has focused on many different activities relevant to rural community life, including rural household skills, promotion of locally produced food, folk schools, emergency relief, handcrafts, wellness, environment, day care, safety, seniors’ issues, and support to other rural community groups and institutions such as schools, community halls, hospitals, and 4-H (WINS 1997).

4-H groups are “in the business of developing well-rounded, responsible citizens—tomorrow’s leaders. 4-H members practice their public speaking skills and learn to work together as a team.”⁷⁹ 4-H is known for teaching young people confidence through public speaking. Ruth Grant, Senior Program 4-H Co-ordinator in Nova Scotia, remarked that high school teachers often tell her they can easily pick out the 4-H members because they are good at public speaking (personal communication, March 12, 2008).

Another key strength of 4-H is that it is an intergenerational organization, where older youth help younger children, and where older community members volunteer their time to work with the younger 4-H members (Scott et al. 2003).

⁷⁸ The material for this section draws heavily on Scott & Colman 2008:223-231.

⁷⁹ Available at www.pei4H.pe.ca. Accessed February 2008.

Table 17 shows the number of participants and volunteer leaders in Nova Scotia over time. Although the organization remains vital and active today, Table 17 indicates that participant numbers are dropping—a 20% membership decline in Nova Scotia since 1988. The number of provincial clubs has dropped by one-third. This reflects the decline in the number of farms over the same period.

Table 17: Membership in 4-H, NS, 1988–2007

Year	Number of members	Number of leaders	Number of Clubs	Number of Census Farms
Nova Scotia				
1988 ⁸⁰	2,933	962	131	4,283
1992 ⁸¹	2,954	1,108	122	3,980
1994 ⁸²	2,813	1,110	115	3,980
1995 ⁸³	2,827	1,071	110	3,980
1996 ⁸⁴	2,893	1,076	106	4,453
1997 ⁸⁵	2,751	1,033	109	4,453
2003 ⁸⁶	2,398	936	87	3,923
2007 ⁸⁷	2,356	829	88	3,795

In a study of farm families in Canada (Martz and Brueckner 2003), 40% of youth stated they are actively involved in youth farm organizations, such as 4-H, agricultural societies, or junior farmers’ organizations. The study also found that parents in farm families see farm clubs such as 4-H as an important way to socialize their children into farming culture and as places where youth can gain an interest in agriculture. Parents and other youth also said they encouraged children to be a part of clubs such as 4-H as they teach youth practical skills about various aspects of farming such as how to care for animals, how to do book-keeping, and how to market their produce and animals.

What is it about farming that encourages volunteerism? One reason might be the culture of helping each other out. Because farm families needed each other to get all the work done to survive, it was just not ok to refuse the help a neighbour. Interviews with farmers Nova Scotia (Scott et al 2003) give us a glimpse into this culture. A farmer in Lunenburg County recalls:

⁸⁰ Information from the 1988 NS Department of Agriculture and Marketing Annual Report.

⁸¹ Information from the 1992 NS Department of Agriculture and Marketing Annual Report. Note: 1992 appears to be a peak year for 4-H membership in Nova Scotia, even though the number of clubs is diminishing.

⁸² Information from the 1994 NS Department of Agriculture and Marketing Annual Report.

⁸³ Information from the 1995 NS Department of Agriculture and Marketing Annual Report.

⁸⁴ Information from the 1996 NS Department of Agriculture and Marketing Annual Report.

⁸⁵ Information from the 1997 NS Department of Agriculture and Marketing Annual Report.

⁸⁶ Information from Liz Crouse, Manager of 4-H and Rural Organizations, Nova Scotia Department of Agriculture and Fisheries, Personal communication, December 2003.

⁸⁷ Information from Ruth Grant, Senior 4-H Program Co-ordinator, Nova Scotia Department of Agriculture. Personal communication, March 12, 2008.

In the spring of the year, we would all have eight-foot lengths of wood to saw up. So everybody would get together and go from place to place. You would go to one neighbour's place, cut up his wood and have a meal there. We spent about three weeks doing that until everybody in the neighbourhood was sawed. Of course you still had your chores to do after you were finished. We did the same thing with grain. So we shared the machines—we would trade back and forth, thrashing grain.

Another Lunenburg County farmer affirmed her experience of community residents supporting each other in times of need: “If you have lots of people feeling needed, that they belong, that this is *their* place, I’m sure that the community as a whole is more resilient because you know other people. When tragedy strikes, one of the most important things is to know that you’re not alone.”

And another Nova Scotia farmer noted that this mutual reliance and support is no longer as strong as it once was: “We’re all dependent on each other more than we’d like to think. I think we’ve had a little experiment where we have become less community minded, and I think our collective psyche is... bothered by that now.”

Another Nova Scotia farmer noted the unique combination of self-reliance and mutual reliance that was essential to rural living in Preston. Pride, he said, is important for a community to survive, but at the same time it’s important not to have so much pride that one doesn’t ask for help when one needs it: “That’s when you’re off to yourself and that hurts the whole community because no one wants to deal with you any more. If you got pride *and* you’re working with everybody, that’s beautiful.”

One Nova Scotia farmer remarked how much respect she had for the Mennonite community living around her:

They really take care of people in the community. If something happens, they’re there, they help. We had an emergency and we needed 18 cords of wood moved and they were right here, no questions asked. We’d had a house fire. And when the contractor came to do the renovations, we had to move the 18 cords of wood out of the basement. It was just beyond anything that we could do in the time that we had to do it. They came down. I built huge pots of beef stew and massive amounts of biscuits. They were all here when the house was burning down—people bringing us tea and coffee, quilts just to get us through.

One Nova Scotia farmer reported that in his childhood

there were other farms but they were at least a mile apart. There was one thing beautiful about it:—if anyone had a hardship, everyone else was there to help. I know just before I was born our house burned down in February. Everyone was there to help. They [parents] had lost everything and had six children.

And yet another Nova Scotia farmer presented a vision of the ‘economy of care’ that still exists in rural communities, and which all of these examples (and his own) typify:

One of the writers I read a while ago used the term that instead of an ‘economy of growth’, which is the one we function under, perhaps we are going to be forced to go to an ‘economy of care’, where we consider other things, so that economic activity takes on a different perspective in terms of its role in our community, in our nation and even in our world. It starts with people, so when people become more informed and begin to understand some of the dynamics at play, then change becomes possible.

When I was ill I had been slow making hay because I just didn’t have the energy. One Sunday morning, three guys came down around 10:30 and said, “Tom, we’ve heard you’re not doing good. We’re going to help you.” You wouldn’t hear that in the city. Rural communities are special places.

This farmer’s wife also remembers “the time you were in the hospital and they arranged a bake sale for us. They brought all the stuff here. That was really nice. They supported us financially.”

Along the same lines, another Nova Scotia farmer recalls the night his dairy barn burned down on Christmas Eve, 2002:

The next morning, other dairy farmers from all over the province showed up to pick up the milking cows. They took them home to their own farms, milked them and cared for them until we were ready to take them back when the new barn was built. Without a word or any expectation, they just showed up to help out.

The density of community networks could also be identified as an important criterion of mutual reliance and support. In this regard, a key indicator of such density is the degree to which local and regional networks provide goods and services to community members. Conversely, dependence on large centralized retail outlets and on service providers instead of other community members might be regarded as a sign of a compromised community culture. One possible variation of this indicator—also linking community collaboration and mutual support with livelihood and economic outcomes and exploring possible explanations for higher rates of mutual reliance—might be the degree to which rural residents are able to live on less money in cases where resources are shared and bartered more frequently, and where community members rely more strongly on each other.

Trust

Where people rely on each other, trust develops.⁸⁸ This might be demonstrated comparatively by indicators like the proportion of residents in different communities who lock their doors, or the percentage of the population that has security systems installed.

The trust issue was woven through many of the comments in the 2003 GPI farm interviews (Scott et al. 2003), but only two respondents—both from Nova Scotia—addressed it directly. A farmer near Antigonish said that what he likes about his community is that he can leave his tool shed unlocked: “People come and borrow my tools all the time and I don’t have to worry about it because I know they will be returned.” And another Nova Scotia farmer commented: “I would measure trust by the number of tables by the road with produce offered and a jar where people can leave their money.”

Relationship-based economic activity

Another benefit of local food systems is it promotes relationship-based economic activity rather than greed-based economic activity. A family doctor in rural Hants County Nova Scotia said that 90% of her patients made appointments with her because they were lonely. Loneliness must cost our stretched provincial health care system hundreds of thousands of dollars every year. Eating local food allows people to reconnect and be less isolated (Ikerd 2005). The industrial food system depends on impersonal economic relationships among farmers, food processors, food distributors, and consumers. “Economic efficiency demands that relationships among people and between people and nature be impartial, and thus impersonal” (Ikerd 2005). As a result, many people today have no meaningful understanding of where their food comes from, and very little understanding of the consequences of its production. By eating locally-produced food, people are able to reconnect with local farmers, and through local farmers, reconnect with each other and the earth. It has been documented that people have far more conversations and interactions at a Farmers’ Market than at a grocery store. “Many people first begin to understand the critical need for this lost sense of connectedness when they develop personal relationships with their farmers and actually visit the farms where their food is produced” (Ikerd 2005).

One example of economic activity that is more relationship-based than others is farmers’ markets. In Nova Scotia, there are now more than 15 farmers’ markets operating in different parts of the province (Don Black⁸⁹, *pers. comm.* February 4, 2008), and they are doing business valued at more than \$62 million to the provincial economy.⁹⁰ Farmers’ markets⁹¹ have been found to perform vital economic functions that can substantially enhance farm viability. Direct interactions between customers and farmers builds social

⁸⁸ Scott & Colman 2008: 233-4.

⁸⁹ Don Black is Coordinator, Farmers’ Markets of Nova Scotia Cooperative Ltd

⁹⁰ See Farmers’ Markets of Nova Scotia Cooperative Ltd website: <http://nsfarmersmarkets.ca/>. Accessed March, 2008.

⁹¹ This section on farmers’ markets is largely from Scott & Colman 2008, pp.186-198.

fabric and increases livelihood opportunities for farmers. Farmers' markets are incubators and catalysts for small business ventures, as they are low-risk venues to test products and receive direct customer feedback before investing large sums in production capacity.

A PEI farmer describes the farmers' market as a social service provider:⁹²

The regional or local market can compete with more mainstream food retailers by being a service provider, based on the customer, not the bottom line. People are willing to pay more where there is good service and it is a comfortable, fun place to be. Like the Charlottetown Farmers' Market on Saturday morning—face to face for farmers, consumers, and neighbours. There is an interchange that occurs.

One PEI customer reports that quality is the key to success:⁹³

A pork farmer in my area found that the [commodity] market price made it difficult for him to make a profit. So he continued to produce pork, but he took a new marketing approach. He sells 50lb lots of pork to people he knows. The direct consumer contact means he makes a profit. It works for him and it works for his customer, who is very happy with the quality of the pork. It's three times better than what I could get at the grocery store. I do the same thing when I buy chicken from a neighbour farmer.

Alan Stewart sees the weekly Wolfville Farmers' Market as an event that connects people in his community: "I think its important that if people can come here, not see each other all week, and just reconnect with them again, like clock-work, all summer long, I think we are serving a wonderful purpose."⁹⁴

In 2003, Brian Boates described his experience with U-pick customers—another infrastructural element of local food webs that often creates even deeper farmer-customer relations than farmers' markets, since U-pick situations bring consumers right onto the farm itself to partake of the actual harvest process:⁹⁵

The people you get would be people that bring their young kids for a day at the farm. And quite often they are families that see that as sort of an intrinsic value to bring kids to the land. And people that just like to know the farmer, they like to come and pick their apples and get to know you a little bit. It's very interesting at our U-pick we have people now where they'll come and they'll say 'we come here twice a fall, and we used to come and bring our kids and these are our grandkids and we bring them now'. They'll probably keep those apples in their cold room till Christmas.

⁹² Scott & Colman 2008:188.

⁹³ Scott & Colman 2008:188.

⁹⁴ Scott & Colman 2008:220

⁹⁵ Scott & Colman 2008:188.

Digging deeply into the social consequences of the disconnect between farmers and non-farmers, we need to go beyond the relationships of the Farmers' Market or U-Pick, or farm gate store. Many farmers feel a deep-seated rage from being treated as second-class citizens. This is described in the book *The Mountain and the Valley*, by Ernest Buckler, set in the Annapolis Valley of Nova Scotia in the years leading up to WWII. That book was written in 1952 but the misunderstandings and subtle pity and contempt continue today. Consumers' enthusiasm for local food will help to heal that huge and hidden social wound, but further steps are required. Farmers have been making sacrifices for years (no vacation, no pension, no child care, long hours, dangerous work, unpaid and underpaid work, etc) and now it is time for consumers to humble themselves and show they are willing to make some sacrifices too. Like paying the true costs of growing and raising food. Like going to the farm in organized groups to harvest and buy in bulk. Like organizing the buyer-seller relationship based on what is convenient for the farmer.

Once the relationship between farmers and consumers is rebuilt, many win-win arrangements will emerge. By eliminating the middleman, producers can increase the portion of the food dollar that goes back to the farm, and consumers will find they can eat very well for less money (especially when convenience foods make up a smaller portion of their diet). In general farmers are not interested in charging more for food than it is worth. Generational farmers are used to living on a low income, and it is a matter of honour to be fair. The only parties that will lose out in this arrangement are retailers, transport companies, and advertisers. According to Ikerd (2005), buying food locally "saves on transportation and energy and virtually eliminates wasteful spending for unnecessary packing and advertising, which together account for more than 20-percent of total food costs."

Province-Wide Benefits

People are generally unaware of the benefits that farming brings to this province. That is why it is important to lay it out and break it down in this report. Farming gives us food sovereignty, food with integrity, variety and choice, the raw materials for beautiful meals, and nutritional quality. Farmers also perform a land stewardship service.

Food Sovereignty

A benefit of having locally-produced food is that we continue to produce some food here, and continue to *know how* to produce food here. If we didn't produce food here, we could quickly experience higher prices for imported food, or experience food shortages if there is a disaster that cuts off food supplies. This is known as food sovereignty.

One of the motivations for greater bioregional food self-reliance is that it gives communities a greater degree of self-determination that is generally lacking in the industrial model. "The heart of food sovereignty is reclaiming decision-making power in

the food system. This means that people have a say in how their food is produced and where it comes from” (People’s Food Policy Project website). Imported food is “relatively more susceptible than locally produced product to price pressures from external factors such as increases in transportation costs or adverse weather in major food exporting areas. Of further concern is that Nova Scotians are unable to verify the safety of imported foods under current import requirements” (Roberts et al 2005:3).

Food with integrity

People want food with integrity. They want to trust it is not going to make them ill, and to trust the food is what it claims to be. When there is no integrity or accountability in the food system, we replace the natural trust that comes from people working together in a farm community with a costly regulatory system, along with its bureaucracy. In addition, one-size-fits-all regulatory measures can sometimes regulate smaller players out of business. Smaller farm, slaughter, or canning facilities, for example, will have higher per-unit costs of compliance than the larger companies. Unfortunately, imposing regulations uniformly regardless of business size can sometimes eliminate the very kinds of businesses that don’t need those regulations. Losing businesses can be devastating both for the community that hosts them, and for the farmers who supply them.

In the US, Ikerd (2009) has documented a basic dissatisfaction with industrial food that is similar to that in Canada. “At no time in recent history have so many Americans expressed so little confidence in the basic integrity of their food system. For example, more than 90 percent of consumers in recent polls have supported labeling of foods which contain GMOs.” He also notes that roughly 75 percent of American consumers have consistently indicated a strong preference for foods grown in their own country, preferable locally on small family farms. Parents in many school districts have demanded that soft drinks and fast foods be removed from their schools and replaced with wholesome local foods. Increasingly, Americans are choosing to buy more of their food locally, from people they know and trust, so they won’t have to worry about such things as empty calories, pesticides, GMOs, E coli, or “mad cow disease.” Many Americans have simply lost confidence in the integrity of the food corporations and the government agencies with whom the integrity of the food system has been entrusted. Increasingly, Americans want to know where their food comes from, they want to know how it is produced and who produced it; they want food they can trust.

Sustainable food and farming systems must be built upon a social and ethical foundation that reflects a commitment to caring for other people, both of this and future generations, as we would have them care for us. Sustainable food and farming systems must have integrity. In integrity, there is quality, both in food and in life.

Other costs of a food system without integrity is food scares and recalls. When people are not paid enough to work in a plant or on a farm, they are not going to care if cutting corners might affect the health of some consumers they will never meet, or who live thousands of kilometers away. Table 18 lists examples of recent food recalls. In the New

England Journal of Medicine, Dr. Dennis Maki looked at overall costs of salmonella outbreaks in the United States. He asks “how foodborne disease can develop in 76 million residents of one of the world's most technically advanced countries each year, causing 350,000 hospitalizations and 5000 deaths and adding \$7 billion to our health care costs, despite intensive regulation of food production and distribution” (Maki 2009: 952).

Table 18: Recent Food Scares and Recalls

Recall	Details	Cost
Peanut salmonella outbreak ⁹⁶ - traced to a Georgia producer's peanut butter	<i>S. Typhimurium</i> enteritis had been diagnosed in 600 persons in 44 states and Canada by February 8, 2009	
Listeriosis Outbreak - Maple Leaf deli meats ⁹⁷	June-Sept 2008. 22 deaths, hundreds of people fell ill in Canada	“Maple Leaf Foods has agreed to pay up to \$27 million to settle class action lawsuits over the deadly listeriosis outbreak linked to 20 deaths across the country.
Salmonella Saintpaul Outbreak - pepper and tomatoes harvested and packed in Mexico ^{98 99}	June-July 2008. The outbreak was linked first to raw tomatoes and then to fresh peppers sickened 1,403 people in the US and Canada, hospitalized 282 and contributed to two deaths.”	Industry estimates suggested tomato growers lost at least \$200 million when federal officials first implicated the produce as the cause in the Saintpaul outbreak, then switched to peppers.
E. coli East Coast Outbreaks - in Taco Bell restaurants	Dec 2006 to Jan 2007	
Spinach and E. coli Outbreak	Sept-Oct 2006	

In PEI Phil Ferraro relates greater local self-reliance to improved food safety: “Trace-back systems do not provide security. They only provide a system of recall and source identification. Local or bioregional food systems are inherently secure because any terrorism or other food safety issues remain localized.”¹⁰⁰

During our investigation of products in Nova Scotia grocery stores, Food Action

⁹⁶ Maki (2009). <http://content.nejm.org/cgi/content/full/360/10/949>

⁹⁷ <http://www.cbc.ca/canada/story/2008/12/18/listeriosis-settlement.html>

⁹⁸ <http://www.msnbc.msn.com/id/29305315/>

⁹⁹ Maki (2009). <http://content.nejm.org/cgi/content/full/360/10/949>

¹⁰⁰ Ferraro, P. 2003. Evaluating our successes: The Post-Utopian World of Organic Agriculture—An Agricultural Movement or an Agribusiness Industry? ACORN Conference, March 14, 2003. Halifax, Nova Scotia.

volunteers phoned the 1-800 numbers on cheese packages to find out where the milk in the cheese was coming from. In a number of cases the companies were unwilling or unable to provide that information. Why not? Because they didn't know or were ashamed of where it came from? Both cases should be a cause for concern. If they do provide an answer, how can we trust it? In one case in particular, they refused, citing the province of origin of the milk and province in which it is processed to be proprietary information. In a local food system, customers can ask questions, and check up on local producers. It is far less likely that the wool will be pulled over their eyes. There is a great deal of uncounted value associated with trust.

If a farmer must look their customers in the eye, this will go a long way to prevent food quality problems. In fact, it is an excellent **built-in incentive for the farmer to increase quality**. Ikerd (2005) has observed that when people eat locally-produced food, farmers form relationships with customers who care about the consequences of how their food is produced – not just lower price or more convenience. In turn, those who eat locally “form relationships with farmers who care about their land, care about their neighbors, and care about their customers – not just about maximizing profits and growth.” These relationships of trust and integrity are based on “honesty, fairness, compassion, responsibility, and respect.” Trust built up between farmers and customers is a social benefit with a lot of value.

Variety and choice

A benefit of sourcing products from the global food system is an increase in variety and choice of foods, but it can also lead to homogenization of foods (and culture), particularly convenience foods or ‘fast’ foods (Ikerd 2005). In his best seller, *Fast Food Nation*, Eric Schlosser writes of the growing costs of our “love affair” with fast foods. He states, “fast food has triggered the homogenization of our society.” Virtually all of food items in supermarkets and franchise restaurants today, in any city, are produced using the same mass-production, industrial methods. The ‘variety’ in foods today is largely cosmetic and superficial. By choosing local food, buyers can get the food they actually prefer rather than accept whatever is offered. They can buy foods that are authentically different, not just in physical qualities but also in the ecological and social consequences of how they are produced. They can choose to pay the full cost of food, rather support the exploitation of society and the environment. (Ikerd 2005) The costs associated with a global, industrial, homogenized, fast food system have become so expensive that people are willing to invest heavily in alternative systems. The Slow Food movement, with its snail mascot, is one example of a reaction to fast food. Slow Food has over 80,000 members in 100 countries committed to promoting the diversity of local and regional quality food produced and marketed in a way that guarantees farmers a fair price and protects the environment and the natural landscape (Ikerd 2005).

Raw materials for excellent meals

Eating locally-produced food makes at-home eating worth the time and effort. When we switch to eating more locally-produced food, we tend to rediscover the excitement of eating food according to the season. Instead of eating cardboard strawberries all year, we enjoy great-tasting strawberries in season. We relish each new food as its peak season emerges: fiddleheads, hardy greens, strawberries, the gush of beans, and early potatoes. Then tree fruits and bush berries start, tomatoes and corn, and from then on it is a flow of fresh tastiness. We wouldn't appreciate these tastes if we had inferior imported versions all year.

Preparing whole locally-grown, minimally processed foods requires additional time and effort. But, the superior natural quality of local foods allows almost anyone to prepare really good foods at home, with a reasonable amount of time and effort. Chefs at high-end restaurants freely admit they prefer locally grown food items in part because of their ease of preparation (Ikerd 2005). Home preparation of farm-gate foods can also save money, particularly compared with convenience foods, which makes really good food affordable for almost anyone who is able to prepare them from scratch. Nova Scotia consumers benefit most from locally produced food when they can purchase the local products during the peak harvest season when there are sharp reduction in prices of fruits and vegetables.

Preparing and eating meals at home also provides opportunities for families to share quality time together in creative, productive, and rewarding activities, which contribute to stronger families, communities, and societies.

Having worked at both a grocery store and a farmers' market, one of the report authors noticed that people buying food in a grocery store are often ashamed of what they are buying. People buying food at a farmers' markets are excited about what they are buying. What is the cost of shame in a person?

Nutritional quality and vitality of food

A food system dependent on shipping food long distances, harvesting before ripeness, and long periods of storage can take a toll on nutritional quality of food (Pawlick 2006; Ikerd 2005; Jones 2001). In his review of nutritional potency of food in the UK, Jones (2001:43) found that some nutrient losses, in particular vitamin C, vitamin A, riboflavin and vitamin E, will occur even with excellent storage conditions. A decrease in vitamin C begins immediately following harvest (Table 19), though the decline can be slowed by limiting exposure to heat, air, and light. Since 1940, there has also been a significant decline in calcium content (down by 46%) and copper (down by 75%) in fruits and vegetables. Carrots have lost 75% of their magnesium and broccoli has lost 75% of its calcium. Fruits and vegetables such as apples, carrots, grapefruit and oranges are more likely to preserve their nutritive value over long periods of storage, while such products as kale, broccoli, and green beans are more susceptible to nutrient loss. For instance, a study of green beans showed that when stored at 10°C for 24 hours, the green beans lost

10% of their vitamin C and when stored at room temperature for 24 hours they lost 24% (Zepplin & Elvehjem in Jones, 2001). “About 10 to 50% of nutrients may be lost during the weeks that typically pass between harvesting and arriving on the supermarket shelf. A study carried out on fresh peas and spinach has also demonstrated that antioxidant activity in fresh vegetables tends to reduce over time.”¹⁰¹ It is virtually impossible for consumers to determine the length of time from the field to the table for foods that they buy. No label will tell them the nutrient loss that has occurred, how it was harvested and stored, or the food’s loss in value.

Table 19: Loss of Vitamin C in Leafy Vegetables After Harvest¹⁰²

Time after harvest (hours)	Loss (%)
2	4
8	10
24	5 - 18
10 - 30	35 - 60
38 - 66	90

There is also evidence that produce in Canada is losing its nutritional content over time. Every three to four years, Agriculture and Agri-Food Canada publishes tables showing the current nutritional content of various foods in grocery stores. When analyzing the data, Pawlick (2006) found that a fresh tomato has 61% less calcium than it did in the 1950s. Across the board, some nutrient losses have been as steep as 70% over a 50-year period.

In addition to the time between harvest and consumption, Jones (2001) advances three reasons for the loss of nutritional quality in food: the use of fertilizers; plant breeding and selection criteria; and food processing. With the first reason, it is possible that the use of synthetic fertilizers have increased the basic nitrogen, phosphorus and potassium (NPK) available in the soil at the expense of other factors. Also plant breeding, which has concentrated on disease resistance, appearance and shelf life has neglected trace element content. Growers who produce for local customers don’t have to give priority to harvesting, packing, shipping, and shelf life qualities, but instead can select, grow, and harvest crops to ensure peak qualities of freshness, nutrition, and taste (Ikerd 2005; Pawlick 2006).

Jones (2001: 43) notes that although the evidence is not perfectly clear, the trends show a decline in food quality connected with the modern global food system. He points out that our diets are already deficient because we don’t eat *enough* fruits and vegetables. Eating deficient fruits and vegetables compounds the problem. “For healthy diets, UK fruit and vegetable consumption needs to double from the current level of around three portions a day, to at least five portions. However, in meeting this target, the goal of optimizing nutritional intake will be achieved only if distance between producer and consumer and

¹⁰¹ Hunter K.J. and Fletcher J.M. Effects of processing and storage on the antioxidant activity in vegetables. Unilever Research, Colworth, n/d unpublished. Cited in Jones 2001: 43.

¹⁰² Fafunso, M. and Bassir, O, 1976. Effect of cooking on the vitamin C content of fresh leaves and wilted leaves. J.Agric. Fd. Chemistry. 24, 354-355. Cited in Jones (2001), p.43.

the amount of processing is minimized.”

What are the nutritional benefits of locally-grown food? Minimizing the time and distance between field and table helps reduce nutrient losses documented above. New techniques and unheated, season-extending greenhouses help to provide fresh vegetables for more months of the year in Nova Scotia. For the months when fresh fruit and produce are not available (although local products like onions, carrots, potatoes, and apples are available all year), local produce can be frozen, canned, or stored in a cold cellar. Still some fresh produce could be brought in to complement, not replace, what can be grown here. And of course, livestock products are available year-round.

Although there are few studies on dietary patterns in local food systems, a survey was carried out of 275 people who were members of community supported agriculture farms in Massachusetts. The dietary patterns of these people were compared with a control group. In the study, 82% of members reported an increase in the amounts of vegetables eaten compared with 39% of non-members.¹⁰³

Stewardship

Nova Scotia farmers have put effort into environmental stewardship and – whether deliberate or not – also provide an open, scenic, interesting landscape for us all to enjoy. Nova Scotia producers have taken initiative in environmentally sustainable food production. They developed the Environmental Farm Plan process to ensure that their farm businesses do not endanger the environment. Many of the environmental safeguards require capital investment, an initial cost to learn and adopt the new systems, and ongoing expenses. There are provincial government grants available to help cover some of the initial expenses. However, the on-going expenses that provide a general benefit to society have not been reflected in farm gate food price. Although it is possible to capture some of the ‘value’ created by scenic beauty through agro-tourism businesses or farm B&Bs, farmers are also generally not compensated for their contribution to scenic beauty and enjoyment of the rural landscape.

Farmers are not getting an adequate price in the marketplace for the social benefits they provide for ongoing food chain traceability or environmental protection (Roberts et al 2005:8). They have to compete with the lowest cost imports, while paying the price for extra social safeguards to the local food system. Governments, on the other hand, benefit from their ability to manage potential outbreaks of food-borne illnesses.

Elsbeth Wile, a dairy farmer in Lunenburg County Nova Scotia, speaking in 2003 illustrates this point (Scott et al 2003:75).

¹⁰³ Cohen NL, Cooley JP, Hall RB, Stoddard AM., 1997. Community supported agriculture: a study of members’ dietary patterns and food practices. In: Agricultural Production and Nutrition, School of Nutrition. Tufts University, USA. Cited in Jones 2001:62.

We are on a lake and we've been addressing some of these [environmental concerns]. We've had to invest in all kinds of things to prevent run off from going into the lake. We've spent money that other people haven't spent and we don't get more money for our milk because we've been environmentally responsible.

There is some awareness that farmers can increase the value of a place – in terms of real estate value, or tourism value, or simple enjoyment value – through their stewardship efforts. A young farmer in PEI nailed this value when he said that farmers make the land look alive and it shows that communities and people are alive (Scott et al 2003:21). Apple blossoms in the spring, pumpkins in the fall, livestock grazing, emerald green pastures in the spring, fields of oats and barley are all aesthetically pleasing. People don't go for drives on Sunday afternoons to see brush growing up in old fields.

'That Damn Dutchman's Cheese' is a small farm-based business on the Parsborro shore, and was featured in the March 2003 issue of *Rural Delivery*. As described in that profile, the definition of success for this business is *not* expanding, gaining market share, or relying on employees to do the grunt work—as in most conventional business models. Instead, business success is defined by this cheese maker as pride in quality of products, and a good quality of life—living and working with family on a beautiful piece of land. Part of the business 'package', therefore, is being a destination with beautiful grounds; offering visitors the opportunity to watch cheese being made; and having a gift shop, livestock, café, etc.¹⁰⁴

Incorporating Social Benefits Into the Price of Food

Many of the benefits discussed above are 'externalities' – that is, the benefits of having farming in this province are not connected to the price of food. They are enjoyed by people whether they buy locally-produced food or not. Somehow we need to 'internalize the externalities' in a way that encourages people to buy the food that produces most social benefit. It makes sense for food producing the most benefits to have the lowest price. This would happen if somehow farmers were actually paid directly for the social benefits they provide. However, they are not.

If we had a thriving local food system where customers knew and valued farmers for all that they do, farmers who have the most integrity and generate the most social benefits would automatically get the most business. Although this scenario is occasionally observed, it is no longer the normal way of doing business.

Another far from ideal option is to differentiate and identify the products that – in their production – produce the most social benefits. We can rely on the social conscience of each consumer to choose those products and be willing to pay more for them. The classic example is organic certification where farms go through an assurance, inspection and audit process to make sure they are following agreed-on environmental practices. The

¹⁰⁴ Scott & Colman 2008:198.

customer is willing to pay more for food that is organically certified because the environmental benefits of organic production are important to them. If the farmer gets to know customers directly and trust builds between them, then organic certification is no longer necessary.

Unfortunately, charging more for food with higher public benefits is somewhat counter-productive, but the best option we have for now. It is like our taxation system where we tax good things (like employment through income tax) and don't tax bad things (like pollution). It sends the wrong message and provides the wrong incentives. But for now, certification programs are one of the best tools we have.

Like organic certification, programs have been developed to ensure social benefits from the production of food. Two of them are described below.

One example of a certification program that verifies social benefits is Local Food Plus (LFP) in Ontario.¹⁰⁵ They define 'local' as "produced, processed, and distributed within the province in which they are consumed." LFP inspects farms to make sure they follow the organization's criteria and helps them market their products under the LFP label at a slightly higher price. Their criteria for evaluating sustainable food production includes the following elements:

1. Employ sustainable production systems that reduce or eliminate synthetic pesticides and fertilizers; avoid the use of hormones, antibiotics, and genetic engineering; and conserve soil and water.
2. Provide safe and fair working conditions for on-farm labour.
3. Provide healthy and humane care for livestock.
4. Protect and enhance wildlife habitat and biodiversity on working farm landscapes.
5. Reduce on-farm energy consumption and greenhouse gas emissions.

Criterion number two is the only one that covers a social benefit. Local Food Plus includes 'safe and fair working conditions for on-farm labour', but does not include the same for farmers themselves, as the Fair Trade certification does in the description below.

The second example, Fair Trade, is similar in that it is a certification system that includes both social and environmental criteria and a premium is charged on the products. Just Us! Coffee Roasters Co-op is one example of a business that is certified Fair Trade.¹⁰⁶ They are Canada's first certified Fair Trade coffee roaster and are located in Grand Pré Nova Scotia. Obviously they are not dealing with a locally-produced product, but the concept of Fair Trade is beginning to take hold for products that are grown and processed in Nova Scotia. According to the Just Us! website, Fair Trade "empowers producers and gives them greater dignity and a fairer price for their products and it provides consumers with high quality products that they know are more sustainable from a social and ecological point of view". Just Us! measures its success in terms of "maintaining its

¹⁰⁵ www.localfoodplus.ca

¹⁰⁶ www.justuscoffee.com

relationships with producers, the employment it is able to create locally, and in the community assets it is able to help develop in Canada and abroad” (Mazer n.d.:8).

In their 2007 annual report to Just Us! investors, Debra Moore (acting financial manager and founder) reported that “consumers are demanding that business is done respecting the environment and workers, not just for profit. This year, for the first time, we are pleased to have put together not only Financial reporting, but Social Balance reporting.” In the social balance sheet they report on a number of social indicators including profit sharing to employees and owners; profit sharing to producer groups; as well as donations and organic premiums paid to producers. Among the reported labour indicators, they include employee benefits; number of employees and average wage; and the ratio of highest to lowest wage (3.7 in 2007). The difference between the average wage of a Nova Scotia farmer, and the top executive at Sobeys or Loblaws would be significantly greater than 3.7. More equitable share in the price of food would also be a good indicator of social benefits.

Fair Trade is an international system of doing business based on dialogue, transparency and respect. It contributes to sustainable development by offering better trading conditions for producers and workers in developing countries. Behind the principles and goals of Fair Trade is a rigorous international system of monitoring, auditing and certification.¹⁰⁷ In reviewing the criteria for fair trade designation, it was clear that farms in Nova Scotia would not qualify. For instance, they don’t necessarily get ‘fair compensation for their products and labour’. When Wolfville Nova Scotia was being designated as a ‘Fair Trade Town’, it became impossible to talk about fair trade without recognizing that local farmers deserved the same ‘fair’ treatment as overseas trading partners. Mayor Bob Stead noted that “if the town planned on committing itself to supporting farmers in developing countries, they should also back farmers in their own town. I think the spin that becomes the local attraction is in fact the extension of the concept of fair trade to buy local and a fair return to the producer locally — that’s where the rubber hits the road in terms of the concept.” Stead also said that polls with vendors and residents have indicated that people are prepared to pay more in support of fair trade initiatives.¹⁰⁸

A week after Wolfville was designated as a fair trade town, a news item on coffee broke down the share of a ‘coffee dollar’ spent that goes to producers.¹⁰⁹ The vast majority of the coffee we buy comes from producers who are paid about 54 cents for a pound of beans – or about 11 cents for every dollar spent by the coffee-consuming public. Under Fair Trade arrangements they receive about 28 cents for every dollar spent by the coffee-consuming public. This is much better than the 13 cents per food dollar spent that farmers in Nova Scotia are estimated to receive.¹¹⁰ It is also clear from this news item that people are not hesitating to spend extra money for Fair Trade coffee. In 1998, more than 21,500 kilograms of fair trade coffee was sold in Canada. By 2004, Canadians

¹⁰⁷ <http://www.transfair.ca/en/fairtrade/>

¹⁰⁸ cbcnews.ca Tuesday April 17, 2007.

¹⁰⁹ cbcnews.ca Monday April 23, 2007

¹¹⁰ See Economic Benefits chapter for references.

bought more than 940,000 kilograms of the product. Over the same period, sales had jumped to \$28.2 million from about \$649,000.

Another food initiative that incorporates social benefits is taking place in Wisconsin. The Madison Area Community Supported Agriculture Coalition (MACSAC) in Wisconsin has helped Community Supported Agriculture (CSA) farms get well established. They organize events to promote the farms and encourage people to sign up and pay in the spring for weekly food box deliveries through the summer and fall.

In 2009, 36 CSA farms sold 7,800 shares and served some 18,000 people. In 2010, some 45 farms are offering 9,100 shares, representing a potential \$4 million-plus in sales to local farmers.

In Nova Scotia, CSAs are taking a while to catch on, but the number of CSA farms has grown in the past five years. And so have the number of subscribers. There are now about 20 CSAs in Nova Scotia. Each CSA offers a mix of products suited to the farm and talents of the farmer. Some offer straight vegetables, others offer fruit, honey, eggs, flowers, canned tomato sauce, or even bread and croissants along with the vegetables. Some offer summer shares, others offer full-year or winter shares. Most offer support for customers who want to learn how to prepare delicious meals from the contents of the weekly box.

MACSAC has done something truly innovative that could be adopted elsewhere. They recognized that CSA customers were eating really well, and asked health insurance providers if they would be willing to subsidize the cost of a share. They now coordinate a program called Health Plan Partners, which includes several pioneering insurance companies that offer rebates of up to \$200 a year to their customers who eat local food from CSAs. Since the CSA share cost for a family is \$400 to \$550, this rebate is significant. These health insurance companies get extra exposure through the program, but they are offering a rebate because they know eating fresh vegetables and fruit directly from farms will help their clients stay healthy and have fewer health care costs. This financial recognition of a social health benefit from farm-direct food is a good example of internalizing a positive externality. The dollar value of the health benefits of eating fresh local produce are recognized by the health insurance companies and they are willing to subsidize the cost. This is the kind of incentive for positive behaviour that should be encouraged.

For people with less disposable income, MACSAC raises funds to subsidize their CSA shares. Members of just one CSA (Vermont Valley Farm) donated \$8,435, and are subsidizing 29 shares.

Members of CSAs also have been known to help out the farmer who supplies them (Eisen 2010). One of the larger farms, Harmony Valley, run by Richard de Wilde, offers 1,100 shares as well as selling at farmers markets, restaurants, and grocery co-ops. Customer loyalty literally saved the farm after a flood swept through the area in August 2007. Two hundred and fifty of his customers donated \$50,000 to Harmony Valley, and

the farm never missed a week's delivery during his 30-week season. They got hundreds of small checks in the mail with "nice little notes". De Wilde found it to be an amazing morale booster. As MACSAC co-ordinator Kiera Mulvey puts it, CSA subscribers acknowledge the special status of farmers in society. She says farmers are responsible for our nutrition, for the care of our environment, and for a lot of other values that are hard to put a price tag on.

Conclusions

Many of the social benefits that a local food system can provide, are available at no cost to society. But when society decides to buy the 'cheapest' food from wherever they can get it (instead of supporting the local food system), eventually those benefits will be lost and they are replaced with services we have to pay for. When customers know the farmer and can see their products and production practices, they will support the farms with the best products and best practices. They will support the farms they trust. When the customer is distanced from the farmer by actual kilometers or by 'middlemen' such as processors, wholesalers, retailers etc, that trust has to be replaced by tracking systems or food safety systems that cost money. The number of players along the food value chain and the increasing number of kilometers the food travels also increases the chance that there will *be* a problem with the safety or quality of the food, increasing the need for even more tracking and quality assurance. Another example is the way that people in farming communities tend to help each other out or barter for services as part of farming culture. As farms get bigger and farther apart, the density of the farm population gets lower, and these sharing and co-operative arrangements become less frequent. Farming, then, becomes more expensive. In both cases the farmer loses. Expenses go up, and because farms have so little market power relative to other players, the farm-gate price does not keep pace with increasing expenses. We lose more farms, and it gets harder for the remaining operations (and the businesses that support them) to stay viable.

Imported food that displaces our local food production is therefore quite expensive, but the public is not aware of it because the price tag is not an accurate reflection of the hidden costs or the fact that farmers are increasingly marginalized in the food system. The Fair Trade coffee example above shows that a growing number of people are willing to pay more for a product with proven environmental and social benefits. Farmers in Nova Scotia should be able to charge an appropriate price, based on their real cost of production, for food they produce.

If we could see our province without local agriculture, we would have a better idea of the benefits it brings. It is a case of 'you don't know what you've got until it is gone'. One way to visualize this scenario is to look at communities that used to have a local agriculture system, and now have an export agriculture system. Qualman and Wiebe (2002:14) describe such farm communities, particularly in Saskatchewan, in a way that provides an important contrast to farm communities in Nova Scotia:

The most keenly felt losses in farming communities are the absence of neighbours and communal life. Although this aspect is not quantifiable, and hence seldom taken into account, the restructuring of agriculture has led to a radical change in the culture of farming communities. With fewer people, and with the exodus of most of the young people, community activities are necessarily reduced. In many villages, the centres of community social life—the churches, halls, arenas, clubs, and schools—have disappeared altogether. The loss of cultural diversity and vigour in the countryside parallels the loss of biological diversity, and may pose similar inherent dangers to the long-term sustainability of human survival.

This description may be taken as a warning. Nova Scotia farm communities appear to remain much more vital, resilient, and viable than depicted in Qualman and Wiebe’s description above, and with much stronger networks, bonds, institutions, farm diversity, and other key social benefits than apparently exist today in the Prairie Provinces. However, Nova Scotia farm communities are seeing signs of potential disintegration and adverse comparisons with earlier times.

Historical accounts of agriculture in the Maritimes indicate that, through the intersection of key social and economic initiatives, Nova Scotia did have greater food self-reliance than it has today. In a self-published book, *We Fought for the Little Man: My Sixty Years in Agriculture* (1976), Waldo Walsh, a former deputy minister with the Department of Agriculture, describes agricultural development in Nova Scotia from the 1920s to the 1970s. He notes that the government sometimes resisted “big business” attempts to undermine government agricultural policies designed to enhance food self-reliance and diversity through creating supportive infrastructure such as slaughter facilities and affordable livestock feed.

Walsh (1976) also describes the importance of co-operatives; 4-H; and the original ‘production clubs’ to farming, and he acknowledges the human capital component of farming in Nova Scotia by praising the ‘fine people’ who came from the province’s farms and recognizing them as anchors for their rural communities. The book also acknowledges the value of social capital in agriculture in describing the attention, care, time, and great efforts required by farmers and others to build beneficial institutions and relationships conducive to effective farming in Nova Scotia. Walsh did us a service by describing what we could lose by refusing to choose locally-produced food.

An attempt to list the social benefits of Nova Scotia agriculture appears in Table 20. Likely many benefits have been left out, but it is a start. Also, these social benefits should have dollar values attached to them. This is not easily done without intensively surveying farmers and customers. For now, the narrative report will help people begin to get an understanding of the social benefits of Nova Scotia agriculture.

Table 20: Summary Table -- Social Benefits of Nova Scotia Agriculture

Benefits to rural	Employment
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communities	Stability and durability
	Maintenance of rural infrastructure
Benefits for people and relationships	Farming culture
	Social capital
	Mutual reliance
	Trust
	Relationship-based economic activity (Farmers' Markets)
Province-wide benefits	Food sovereignty
	Integrity
	Variety and choice
	Eating locally-produced food makes at-home eating worth the time and effort.
	Nutritional quality and vitality of food
	Stewardship

Transportation

Recent studies have shown that food is transported much greater distances to get from farm to market than it used to. Only a generation or two ago, people knew where most of their food came from, or at least had relatives with farms they could visit. Now, the distance between people who eat food (that is all of us) and people who produce it (not very many of us) is vast. We are a society that is ignorant about food, and the void between eaters and producers has been filled by an industrial system that is intent on extracting profit and doesn't necessarily care about us or our communities.

Average Distance Food Travels

Food travels great distances because transport is relatively inexpensive; because communication networks allow us to source food products from all over the world; and because we are eating foods that have been processed so much. Table 21 shows the average distance food travels according to several studies. Because Nova Scotia is not centrally located in North America, it is likely our food miles are higher than most. To have food traveling an *average* of more than 8,000 km (including farm supply travel) is quite shocking.

Table 21: Average Distance Food Travels

Pirog et al. (2001)	Average transport distance of produce arriving by truck into the Chicago Illinois terminal market	2,004 km in 1981 2,292 km in 1989 2,443 km in 1998
Xuereb (2005)	Average distance imports of 58 commonly eaten foods are transported to Waterloo Ontario	4,497 km in 2004
Lam		4,685 km in 2004
Bentley (2005)	Average transport distance of dinner ingredients purchased in a Toronto grocery store	5,364 km in 2004
	Average transport distance of the same dinner ingredients purchased in a Toronto farmers market	101 km in 2004
Weber and Matthews (2008)	Total average km embedded in US food items, including transport of farm equipment and supplies to the farm.	8,240 km in 2004

As noted above, food processing significantly adds kilometers and costs (both public costs and costs incorporated in product prices). Processed foods travel many more miles than fresh food. Food processing packages food in such a way that it can be easily transported long distances. According to Stoelje (2008: 4-5), “some foods actually criss-cross the globe for processing or packaging before they return home for local sale.”

Add shopping to the distance food travels

Studies have shown that of the total food transportation occurring in the UK, 65% is getting it from the farm to the shop, and 35% from the shop to the home (Pretty et al 2005). Another UK study shows that 31% of vehicle kilometers is used to get food to the shop in large trucks, but car transport from shop to home now accounts for 48% (DEFRA 2005). Coley et al (2009) show that driving more than 6.7 km round trip to the grocery store is more energy-intensive than a hub/delivery system where groceries are delivered to each person's door. The UK's Department of Environment, Food, and Rural Affairs concludes that "Whilst the data are not at all clear-cut, what there are suggests that – viewed from a single product perspective – the environmental impacts of car-based shopping (and subsequent home cooking for some foods) are greater than those of transport within the distribution system itself" (DEFRA 2006: 142).

Differences in Emissions Between Modes of Travel

The distance food travels is going up, and the way it is transported is shifting to more energy-intensive modes. Pirog et al (2001) documented a significant shift in food transport from rail to truck. In 1981 about 46 percent of produce from continental US arrived by truck and 54 percent by rail. In 1998 nearly 84 percent of the produce arriving at the Chicago terminal market from within the continental United States came by truck. We see in the tables below that transporting food by truck is significantly more energy-intensive than transporting it by rail.

Table 22 shows the energy use and emissions for different modes of freight transport. It is clear that transport by air is much more energy-intensive than by road (truck), with rail and water transport the least intensive.

Table 22: Energy Use And Emissions for Different Modes of Freight Transport (UK)¹¹¹

	Water	Rail	Road	Air
Primary Energy Consumption KJ/Tonne-km	423	677	2,890	15,839
Specific total emissions g/Tonne-km				
Carbon dioxide	30.0	41.0	207	1,260
Hydrocarbons	0.04	0.06	0.3	2.0
Volatile organic compounds	0.1	0.08	1.1	3.0
Nitrogen oxide	0.4	0.2	3.6	5.5
Carbon monoxide	0.12	0.05	2.4	1.4

¹¹¹ Quoted in Xuereb, M. 2005 p.31 From: Atmosphere Emissions from the Use of Transport in the United Kingdom Volume 2. 1989. The Effect of Alternative Policies. ERR and WWF cited in Whitlegg, J. 1993. Transport for a Sustainable Future: the case for Europe. Bellhaven Press, London.

In Table 23, Canadian sources show different carbon dioxide emissions for each transportation mode.

Table 23: A Comparison of CO₂-equivalent Emissions Resulting From Different Modes of Food Transport (Canada)

	Water	Rail	Road	Air
Carbon dioxide emissions g/Tonne-km				
Environment Canada 2002	130	21.2	269	1,101
David Suzuki Foundation/ Pembina Institute 2007	35	20.0	72	1,580
World Resources Institute 2008 – Greenhouse Gas Protocol	222	17	204	1,439

Some of the discrepancy between sources might be a result of the different kinds of vehicles used within each transportation mode. Jones (2001:27) shows more detail in Table 24 for UK transport of food freight, but unfortunately does not include rail. From this table we see that transport by road emits approximately six times as much CO₂ as transport by ship and transport by a long-haul flight emits approximately 50 times as much as transport by ship.

After examining emission factors published by Environment Canada, The David Suzuki Foundation/Pembina Institute, and World Resources Institute (Greenhouse Gas Protocol), we decided to use the emission factors developed for the Greenhouse Gas Protocol and published in 2008 by the World Resources Institute. The GHG Protocol is a partnership between the World Resources Institute and the World Business Council for Sustainable Development. The reasons for choosing this data set are as follows: 1) the emission factors are the most recent, published in 2008. 2) It is the most widely used international accounting tool for GHG emissions. 3) It is based on UK DEFRA, US EPA and IPCC data. We have chosen from among these to use the US EPA emission factors, as a large quantity of our food is imported from the USA and our transportation system is more similar to the US than the UK.

Table 24: Energy Consumption and CO₂ Emissions, Freight (UK)¹¹²

	Water		Road			Air	
	Roll-on/roll-off	Bulk carrier	Transit van	Med truck	Large truck	Short-haul	Long-haul
Primary Energy Consumption KJ/Tonne-km	550	150	1,700	1,500	1,100	23,700	8,500
Carbon dioxide emissions g/Tonne-km	40	10	97	85	63	1,580	570

¹¹² Jones, 2001: 27

Even though it is confusing to have so many estimates, we present them here to give the reader a chance to consider the different sources and make their own estimates of GHG emissions from food transport if they don't agree with ours.

Costs of Transporting Food

Costs of freight transport include greenhouse gas (GHG) emissions, infrastructure construction and maintenance costs, operational costs, and other social costs such as accidents, pollution, and congestion. Only the operational costs, such as vehicle cost and maintenance, insurance, gas, and fees are incorporated into the cost of the food being transported. All the other costs are paid by society as a whole, regardless of what food we buy or how far it travels. Thus there is no incentive to modify our behaviour to reduce the number of kilometers food is transported. For example, if we included the full costs of trucking food across North America from California to Nova Scotia in the price of that food, it is likely most of us would not be able to afford it.

Costs of Greenhouse Gas Emissions

Greenhouse gas (GHG) Emissions, including CO₂, CH₄, and NO_x are widely recognized to be the cause of climate changes such as sea-level rise and chaotic weather patterns. These changes will cause considerable extra expense to pay for damages (such as flooding or crop damage), but we will also have costs associated with our attempts to control emissions to *prevent* damages.

For every tonne of CO₂-equivalent emissions from transportation of food, society pays the cost. Many different estimates of the costs have been made, and initiatives to incorporate that cost into the products or activities that cause those emissions are starting, especially in Europe.

Table 25 shows some of the estimates of damage and control (or prevention) costs associated with GHG emissions. They range from \$13 to \$1,337 per tonne of CO₂-equivalent emissions¹¹³. For estimates of GHG emission costs, \$45 per tonne CO₂-equivalent was chosen.

Table 25: Estimate of Damage and Control Costs of One Tonne of CO₂¹¹⁴

Type of Estimate	Amount per tonne CO ₂	Amount (2007\$C)
Damage Costs (Cline 1996)	\$20-\$50 (1990\$US)	\$49-\$123
Damage Costs (Bein 1997)	\$1,000 (1995\$C)	\$1,337
Control Costs (IBI 1996)	\$34 (1995\$C)	\$45
Control Costs; Klein (1998)	\$10 (1997\$C)	\$13

¹¹³ All of the different greenhouse gases are converted to a CO₂-equivalent amount and combined so that we don't have separate emissions amounts for each greenhouse gas.

¹¹⁴ Walker et al 1999, p. 25.

Costs of highways

Maintaining infrastructure for truck freight in Nova Scotia is a significant cost. In Nova Scotia, our truck freight per capita is higher than the national average, and it is increasing faster than the increase in GDP (Savelson et al 2006: 68). Although US studies generally apportion 41% of highway infrastructure costs to heavy trucks (Transport Concepts 1993), discussions with engineers in the Nova Scotia Department of Transportation showed that *almost all* the damage done to asphalt pavements is from *heavy trucks*, not cars or light trucks (Walker et al 1999). Finally, studies show that roughly one third of all truck traffic on the highway is for transporting food (Stoelje 2008, Pretty et al 2005, Jones 2001).

According to the American Association of State Highway and Transit Officials, the extra weight borne by freight hauling vehicles, typically single-unit trucks and combination trucks, imposes the same amount of roadway damage as 9,600 cars (Stoelje 2008). In addition to the maintenance costs of highways caused by heavy truck damage, ailing infrastructure leads to increased vehicle care costs for all highway users. According to Stoelje (2008), “the average American motorist pays an additional \$413 annually for additional vehicle maintenance and increased fuel consumption caused by driving on poorly maintained roads.” It is likely this cost is higher in Nova Scotia because of our freeze-thaw cycle, which accentuates any damage already done.

In 1999, GPI Atlantic did an assessment of the costs of our most frequently-used highway, the Amherst-Halifax corridor. They determined the proportion of those costs attributable to truck freight¹¹⁵, and divided the result by the truck freight hauled on that highway (tonne-kilometers) to get dollars per tonne-km (Walker et al 1999). Table 26 lists the actual costs and Table 27 lists the estimated air pollution and climate change costs.

Table 26: Highway Costs in Nova Scotia¹¹⁶

Costs	\$ per tonne-km in 1999
Annual highway maintenance: Average \$6,900 per km of two-lane highway	0.139
Highway capital costs:	0.435
Administrative costs	3.54
Accidents	0.92

¹¹⁵ 41%

¹¹⁶ Walker et al 1999

Total costs	5.034
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Table 27: Estimated Highway Costs (Externalities)¹¹⁷

Costs		\$ per tonne-km in 1999
Air pollution and climate change costs	CO ₂	0.403
	SO ₂	0.150
	NO _x	1.449
	Volatile Organic Compounds	1.104
	Particulate Matter	0.054
Total costs		3.16

Table 28 lists provincial government revenues connected with highway use for freight.

Table 28: Provincial Government Revenues for Highway Use in Nova Scotia¹¹⁸

Revenues	\$ per tonne-km in 1999
Diesel fuel tax	0.1478
License fees	0.01
Registration fees	0.12
Toll fees	0.686
Total Provincial Government Revenues	0.974

If we leave the estimates of pollution costs aside for the moment, the net public cost for freight traffic on the highway is \$4.06 per tonne-km¹¹⁹. In other words, the public costs (Table 26) minus public revenues (Table 28), specifically allocated to freight transport, is \$4.06 per tonne-km -- the amount that it costs to have freight transported on the highway, that is not paid for by the freight hauler.

In 1999, 411,165,262 tonne-km were driven on that highway (Walker et al 1999). If one third of the freight truck traffic in that year on that highway was for food, the net cost

¹¹⁷ Walker et al 1999

¹¹⁸ Walker et al 1999

¹¹⁹ \$5.034 - \$0.974 = \$4.06

would add up to \$551 million.¹²⁰ In other words, if freight truck traffic paid what it actually costs to use the highway, they would have had to pay \$551 million. If we include the estimated costs for the pollution they emit, that would add another \$3.16 per tonne-km, resulting in an extra \$429 million on the bill¹²¹ for a total of \$980 million for 1999.

If freight transport trucks were charged the full cost for their use of the highways (public infrastructure) at the toll booth when they enter the province, they would pass that cost on to the shipper, and the cost would be integrated into the price of imported food.

Transport Canada did a full cost estimate of freight transport in Canada in 2008 (Transport Canada 2008). They divided their costs into financial and social. Financial costs included infrastructure capital costs, infrastructure operating costs, and carrier/vehicle costs. Social costs included congestion delay costs, accident costs, and environmental costs (these included GHG, noise, and air pollution). In Table 29 we see that their estimate of the full costs of freight transport by truck is much lower than the estimate generated by the GPI Atlantic study done in Nova Scotia in 1999. Transport Canada did not include administrative costs, like the GPI Atlantic study did (Walker et al 1999), which accounts for a large part of the difference in the estimates. We see that the Nova Scotia study done in 1999 generates a net public cost of freight transportation of \$4.06 per tonne-km (and \$7.22 per tonne-km if pollution costs are included). The Transport Canada study done in 2008 generates a cost of \$0.22 per tonne-km. The GPI Atlantic study (Walker et al 1999) was more thorough in its examination of Nova Scotia highway costs and revenues, and the Transport Canada study (2008) was more recent, so the real costs are likely to fall somewhere between the two estimates.

Table 29: Full Cost Estimates– Freight (\$ per tonne-kilometre)¹²²

Mode of Transport	Financial Costs	Social Costs	Full Costs
Truck	0.203	0.016	0.220
Rail	0.021	0.003	0.024
Air	0.607	0.016	0.623

The Transport Canada study shows how much higher the full costs of truck transportation are compared with rail freight (roughly 10 times higher), and likewise, how much higher the full costs of air freight are relative to truck freight (roughly three times higher). The full cost estimates from Transport Canada will be used to help calculate the costs of transporting food to Nova Scotia consumers in later chapters.

Costs of building vehicles and extracting materials for roads

Any time energy is consumed, the costs go up. Jones (2001:42) collected information on

¹²⁰ 411,165,262 tonne-km * 1/3 for food *\$4.06/tonne-km = \$550,879,218

¹²¹ 411,165,262 tonne-km * 1/3 for food *\$3.16/tonne-km = \$428,763,135

¹²² Transport Canada 2008

the energy requirements for building vehicles and for extracting materials to build roads. Specific cost information is not included here, but inferences can be made from the energy estimates.

It has been estimated that the energy consumed during vehicle manufacture can amount to a quarter of the energy consumed in the life of the vehicle (Jones 2001:42¹²³). Road construction represents approximately 30 per cent of the total energy consumption in the life cycle of freight vehicles (Jones 2001:42¹²⁴). In terms of road-building, the direct environmental impact at the location of the construction, at the source of the construction materials, and the transportation of the materials to the construction site should be included in determination of costs. In the UK, for each kilometer of six lane highway, 100,000 tonnes of aggregate is required.¹²⁵ “The extraction process for aggregates is itself energy-intensive and the sites for quarrying, especially in the South-East of England, are becoming scarce, which results in the transportation from quarries in Somerset, the north of England and the north-west of Scotland, as well as imports” (Jones 2001:42). Nova Scotia pays a particularly high price for aggregates needed for US highways when they are quarried here, as articulated during the opposition to the Digby Neck Quarry in 2006.

Health cost of pollution

Efforts to maintain good health among the citizens of Nova Scotia will save money for our provincially funded health care system. Reduction in pollution from transport trucks carrying imported food products will result from increased local food production. Below, Jones (2001:40-41) lists the kinds of pollutants people experience from transport truck traffic. The Transport Canada (2008) study cited above includes these kinds of pollutants in its social costs of transport figure. It is not clear, in terms of pollution, whether the production and transport of food locally will cancel out the benefits from reducing transport truck traffic from imports.

Pollutants from freight transport and their effects¹²⁶:

Particulate matter: is a complex mixture of organic and inorganic substances in the atmosphere. Particulates can aggravate diseases like bronchitis and asthma by irritating the respiratory system, exacerbating morbidity and mortality from respiratory dysfunction. Diesel particulates are classified as probable carcinogens while suspended particulates have the ability to absorb carcinogens.

¹²³ Rousseaux, P., C. Hugrel and J. Villien., 1996. Partial LCA of different means of transport. Proceedings of the 4th Symposium for case studies, SETAC-Europe, 3 December 1996. Brussels, Belgium. Cited in Jones 2001: 42.

¹²⁴ Lafleche, V. and F. Sachetto, 1995. Italian high-speed train project: a life cycle comparison of four means of transportation. EcoBilan Group, Milan, Italy. Cited in Jones 2001: 42.

¹²⁵ OU, 1993. Resources and the Environment. The Open University, Milton Keynes. Cited in Jones 2001:42.

¹²⁶ Jones (2001:40-41).

Nitrogen dioxide: causes altered/reduced lung function as well as lung tissue damage and the development of emphysema-like lesions in the lungs; acute respiratory illness and irritation of the respiratory tract; and increased susceptibility to viral infection. Nitrogen dioxide also plays a major role in acid deposition in Europe.

Carbon monoxide: is a toxic, colourless, odourless and tasteless gas that combines with haemoglobin in the blood thereby reducing the blood's oxygen-carrying capacity. Exposure to high concentrations results in loss of consciousness and death. At lower concentrations, it affects the functioning of the central nervous system.

Benzene: A known carcinogen which can cause leukemia.

Photochemical Smog is a complex mixture of pollutants which can form in hot sunny weather. Ozone is one of the main components of photochemical smog. Chronic heart disease, asthma, bronchitis and emphysema can all be aggravated. Ozone causes headaches, coughing, damage to the lungs and reduces resistance to illness.

Ozone also reduces vegetation growth and can therefore affect commercial crops.

Full Cost of a Basket of Food (Internalizing the Externalities)

It is important to charge consumers the true cost of producing, processing, and distributing their food. Including all the 'public', or 'external' costs that are presently not included in business ledgers will prevent inefficiencies. For instance, if trucking companies had to pay for their share of highway damage, the cost of trucking would rise significantly, making the price of food imported by truck (especially food imported long distances) much higher than it is now. One attempt to charge for use exists in Switzerland where a Heavy Vehicle Fee (HVF) was introduced in January 2001, as a result of a successful public referendum passed in 1998 (Jones 2001:70). "The HVF charges heavy goods vehicles¹²⁷ (over 3.5 tonnes) based on their gross weight, kilometres driven and emissions. Billing for most vehicles is based on data from an electronic on-board data collection unit that records vehicle mileage and route. At the end of each month the data are transmitted to the Swiss Customs Agency either by mail or electronically. This information is used to generate a bill, similar to other utilities."

In the UK, Pretty et al (2005) concluded that if consumers were to pay the true cost of the food they buy, *on average* about 12% would be added to their weekly food bill. Table 30 breaks down the various costs that are considered to be externalities by the study team. The study authors note that not all possible externalities are included in this table.

Table 30: Cost of Food Basket per Person per Week, UK¹²⁸

	UK pound	Canadian dollar
Price paid	24.79	37.57
Agricultural externalities	0.812	1.23

¹²⁷ Equivalent to transport trucks in North America.

¹²⁸ Pretty et al (2005:13)

Domestic road transport from farm to shop	0.757	1.15
Sea, internal water, and air transport for imports	0.00005	
Shopping (shop to home)	0.411	0.62
Waste disposed to landfills	0.00002	
Total externalities	1.98	
Government subsidies	0.93	1.41
Full cost (including externalities and subsidies)¹²⁹	27.70	41.94

The price paid for a food basket per person reported in the table by Pretty et al 2005 is consistent with food basket cost data from Nova Scotia in 2008. For a man age 25-49, it's \$46.29 and a woman age 25-49 it's \$34.50 (Nova Scotia Participatory Food Security Projects 2009). Thus \$37.57 falls between the two.

Redundant trade

Americans import Danish sugar cookies, and Danes import American sugar cookies. Exchanging recipes would surely be more efficient. – Herman Daly

Redundant trade is the simultaneous importing and exporting of the same product (Gorelick et. al., 2004). While there has been much discussion about the increasing distances our food is traveling, there has been less discussion as to just how much of this trade is needless and how commonplace redundant trade has become.

Miedema (2006) provides the following examples of food swapping. In Ontario's tomato season (July, August, and September 2005), Ontario exported \$69 million worth of fresh tomatoes. During those same months, Ontario also imported \$17 million worth of fresh tomatoes (Industry Canada, 2005). Canada is the second most important destination for California cherries, yet each year the US imports \$19 million worth of Canadian cherries (Gorelick et. al., 2004). It is understandable that Canada would import cherries when its own cherries are not in season. However, redundant trade of a dry good like almonds does not make sense. In one year, the New York City port exported \$431,000 worth of California almonds to Italy and imported \$397,000 worth of Italian almonds.

What does redundant trade mean in the Nova Scotia context? The most notable example is that of apples from far-flung locations filling our grocery store shelves in September. Anecdotally, others have noted the presence of California strawberries just weeks before local strawberries are available and thus preventing

¹²⁹ Pretty et al (2005:13) "This could be an underestimate of the full costs, as many environmental side-effects in the food chain have not been assessed here. These include energy consumed by processors, manufacturers and wholesalers for light, heat, refrigeration and transport, disposal of food packaging, foods consumed by domestic pets, methane emissions from landfill and sewage waste, and the energy required for domestic cooking. In addition, we have not assessed the health consequences of the dietary choices made for the weekly food basket. Such diet-related ill-health is costly, but clearly not a direct consequence of types of agricultural systems."

local growers from receiving the price premium generally received by the earliest crops. Live beef cattle are also being exported out of province, while most of the finished beef that we eat is imported. For more detail on the beef swapping going on, see the beef case study later in this report.

The Challenge of Food Distribution in Nova Scotia

Nova Scotia presents any food business with distribution challenges. The province has a small population spread out over a wide area. Each company cannot economically distribute its products to each store throughout the province. Distributors have to figure out ways to combine products and accomplish the food distribution task in the most efficient way. Below are some comments from the direct experience of two Nova Scotia food businesses. First, Elspeth and Peter Wile have a dairy farm and farm store in Lunenburg County. In 2003 they commented on the challenge of getting local product into their store as the delivery infrastructure falls apart (Scott et al 2003:73):

Elspeth: We went through a period of time when the infrastructure was really good for delivery once or twice a week from farms in the Valley, but in the last three years, all of that has changed.

Peter: Because of the rationalization of the food industry.

Elspeth: ..to two big grocery stores. Now you don't have the wholesalers, and you don't have the truckers delivering to small places like this. This morning, for example, Peter had to go to the Valley to pick up a bunch of stuff. We're using a small local wholesaler here right now, but I believe that in another year, he won't be here. So then where are we going to source some of our stuff so that we don't have to have someone on the road all the time? The transportation is okay in the Valley because the producers are close to the Farm Markets. But when you start moving out of the Valley, it gets expensive and time consuming to truck the stuff.

Peter: I can remember when we sold to the local IGA and the Dominion before it. They merged in with Loblaws. You'd go to the store and you'd see an A.P.Franey truck and another one from a buddy up on the North Mountain. There would be apple trucks, trucks bringing other produce, making deliveries.

Elspeth: And they would pick up small accounts like us to fill in their order, fill out their load and we were in a great spot. Now none of that happens. Scotian Gold used to do it...

Peter: ...but they signed an exclusive contract with Loblaws, dropping all their other routes.

Elsbeth: *We're into our third year of juggling and this month, once you're into August with the corn and potatoes and then the fruits and all that and then into apples. We try to keep it to two times a week – someone from here has to go to the Valley.*

In her book, *It all Started with Daisy* (1987), former Peninsula Farms CEO, Sonia Jones makes several observations of direct relevance to local food producers and suppliers today. Jones notes that independently owned stores were very important to help Nova Scotia businesses like Peninsula Farms Yoghurt get their start. However, she also observes that quality suffers with a 'bottom line' approach, and that conventional thinking about price has to be revisited if we care about quality.

In comments that well describe the hurdles facing small and medium sized farmers today, Jones remarks that distribution in a place like Nova Scotia is one of the major hurdles that small, local food businesses face. She strongly acknowledges the value of co-operation between producers and consumers—in repeatedly stressing the importance of the direct contact with customers that provided the feedback and energy that kept her company going.

Conclusion

Transportation is only one stage in the life-cycle of a particular food item. Garnett (2003) and Pirog (2001) both suggest that it is important to reduce CO₂ emissions in the food supply chain as a whole, and not to reduce emissions in one area at the expense of another, highlighting the need to take a Life Cycle Analysis approach to food system studies. As the food system becomes increasingly industrialized, and food is processed and transported in ever-larger bulk quantities, transportation becomes a smaller portion of the total energy used to get a product to the consumer. The next chapter briefly examines energy use in the food system to follow up on this advice.

Garnett (2008) concludes that the transport stage is growing relative to other life cycle stages. Therefore, it is worth paying close attention to the real costs of transporting goods, in this case food, while also keeping close tabs on the real costs of other parts of the food system. Table 31 summarizes the findings presented in this chapter.

Table 31: Summary of Chapter on Transportation

Average distance food travels	More than 8,000 km plus 35% for food shopping ¹³⁰
Differences in emissions between modes of travel (grams CO ₂ -equivalent per Tonne-km)	Rail: 17 Ship (water): 222 Road: 204 Air: 1439 ¹³¹

¹³⁰ Estimates from Weber & Matthews (2008) and Pretty et al (2005).

¹³¹ World Resources Institute 2008.

Cost of greenhouse gas emissions	\$45/tonne CO ₂ -equivalent
Freight transport damage to highways	<ul style="list-style-type: none"> • <i>almost all</i> the damage done to asphalt pavements is from <i>heavy trucks</i>¹³² • single-unit trucks and combination trucks, imposes the same amount of roadway damage as 9,600 cars¹³³
Actual net public cost of freight transport by highway, NS	\$4.06 per tonne-km in 1999 ¹³⁴
Estimate of total public cost of food freight transport by highway, NS	\$551 million in 1999 ¹³⁵
Estimated pollution cost of freight transport by highway, NS	\$3.16 per tonne-km in 1999 ¹³⁶
Estimate of total public cost of pollution from food freight transport by highway, NS	\$429 million in 1999 ¹³⁷
Estimate of full costs, including financial and social costs for freight in Canada	Truck: \$0.22 per tonne-km Rail: \$0.024 per tonne-km Air: \$0.623 per tonne-km ¹³⁸
Estimated energy cost of vehicle manufacture	The energy consumed during vehicle manufacture can amount to a quarter of the energy consumed in the life of the vehicle ¹³⁹
Cost of a weekly basket of food for one person, UK	\$37.57 Canadian ¹⁴⁰
Full cost of a weekly basket of food for one person, UK, including externalities and subsidies	\$41.94 Canadian ¹⁴¹ - 12% more

Since most food is transported in trucks, the focus here is on freight hauled by transport trucks on publicly funded highways. Freight transport trucks could be charged increasing portions of the full cost for their use of the highways (public infrastructure) at the

¹³² Walker et al 1999

¹³³ Stoelje 2008

¹³⁴ Walker et al 1999

¹³⁵ Estimate based on Walker et al 1999

¹³⁶ Walker et al 1999

¹³⁷ Estimate based on Walker et al 1999

¹³⁸ Transport Canada 2008

¹³⁹ Jones 2001: 42.

¹⁴⁰ Pretty et al 2005: 13

¹⁴¹ Pretty et al 2005: 13

Cobequid toll booth when they enter Nova Scotia, or like in Switzerland, based on electronic on-board collection of gross weight, kilometers driven, and emissions (Jones 2001:70). To keep the system balanced, all forms of transportation would have to absorb similar full-cost charges. In fact, all portions of the food system that use publicly-funded infrastructure would have to start paying their share of the installation and maintenance costs. Then, perhaps, income taxes could be reduced as the freight-user-pay system begins to cover more of the costs normally borne by taxpayers.

Freight transport companies would pass that cost on to the shipper, and the cost would be integrated into the price of imported goods. By gradually charging for use of public infrastructure and even for pollution, this provides an incentive for increasing efficiency, and for use of the most efficient transport system. Naturally, it would work better if it was implemented on a continental basis.

A charge like this would reveal the natural advantage of proximity for locally-produced goods. The food system would change dramatically. Items trucked in would be much more expensive than they are now, some imports would shift to less expensive modes of transport like shipping and rail, and it would make more sense to grow more of our diet here. Presently, Nova Scotians are footing a large part of the bill for freight transport, which is undermining our local agriculture; artificially encouraging trucking relative to rail (Walker et al 1999); and contributing to a fiscal crisis in the province that will prevent us from being able to maintain our road infrastructure.

Redundant trade is another part of the food system that needs to be identified and reduced. In each case there must be reasons that products like apples, beef, lamb, chicken, and salad greens (from April to November) are imported into a province that is able to produce them. These reasons must be honestly brought to light and addressed. Having trucks filled with beef animals leave the province, passing trucks full of frozen beef entering the province does not seem like a wise use of resources. Particularly given the real cost of freight transport.

Energy

Determining energy use or GHG (and other) emissions in the food system helps us understand where we most effectively can reduce our consumption of finite resources (such as oil or coal) and reduce our polluting emissions. We know that there are limits to resource consumption and as non-renewable resources such as oil become more scarce, they will become more expensive too. We also know that there are limits to how much pollution we can emit before the resources and biological systems we depend on will stop providing what we need. The accumulation of greenhouse gas emissions is significantly changing our weather patterns; emissions of air and water pollutants are negatively affecting our health. In the long run, both will hamper our ability to produce food.

We now recognize, more than ever before, that we need to reduce unnecessary consumption, and at the same time, reduce pollution. This chapter attempts to identify the most strategic ways to pursue these reductions. According to Jones (2001:38), the current food system “is linear in design, treating inputs such as energy and raw materials as infinitely available (which they are not), and the environment as infinitely capable of absorbing waste (which it is not).” We need to move away from these consumptive linear systems in which increasing amounts of inputs are feeding increasing amounts of production and waste. And move towards more efficient circular approaches, where we focus on sustainable use of renewable resources, production based on need rather than greed, and re-use of waste to grow more food.

Food System Energy Use

Garnett (2003) and Pirog (2001) both suggest that it is important to reduce CO₂ emissions in the food supply chain as a whole, and not to reduce emissions in one area at the expense of another, highlighting the need to take a Life Cycle Analysis approach to food system studies. As the food system becomes increasingly industrialized, and food is processed and transported in ever-larger bulk quantities, transportation becomes a smaller portion of the total energy used to get a product to the consumer.

Weber and Matthews (2008) calculate that only 11% of life cycle GHG emissions can be attributed to transportation (and only 4% to the delivery stage). They show that GHG emissions are primarily due to the production phase, which accounts for 83% of emissions. They conclude that a dietary shift away from red meat and dairy is more effective in reducing emissions than buying local, as a 21-24% reduction in red meat consumption (shifted to chicken, fish or non-dairy vegetarian meals) would achieve the same GHG reductions as total localization.

There are, however, some uncertainties. Weber and Matthews used data from 1997 and there has been a significant increase in transport distances over the last 13 years. Using a simplified model with 2004 data, the authors determined that transport distances

increased to an average of 2,050 km for delivery and 8,240km for the total life cycle. Because most of the increase is in international shipping, the total increase in GHG emissions is only 5%. The authors also note several other uncertainties in their study. Specifically, they did not address land use issues, such as the GHG effects of deforestation. Nor do they address the differences in production methods, such as grain-fed versus grass-fed meat and conventional versus organic production.

Energy use in the US food system is broken down by two additional studies in Table 32. It is difficult to compare results between sources, or determine what differences in energy use are due to changes in technology over time, or differences in what is included in each sector. Although transportation is a relatively minor portion of the food system’s energy use at 11% or 13% (depending on the source) it is growing relative to other sectors (Garnett 2008). The major energy-using phases of the system are processing and packaging (more than 20%) or the household storage and preparation phase at 25% or 31%, depending on the source.

Table 32: US Food System Energy Use

Sector	% of energy use 2005 reference ¹⁴²	% of energy use 2009 reference ¹⁴³
Farming	17.5	21.6
Transportation	11.0	13.5
Processing	28.1	16.2
Packaging		6.8
Food retail		4.0
Household storage and preparation	25.0	31.1
Restaurant	15.8	
Commercial food service		6.8

Pimental (2008:468) discusses how to reduce energy use in the US food system, and concluded that *reducing junk food consumption* would be the single most effective strategy. More effective than reducing food transport, improvements in food processing, or production technology improvements.

In Canada, the National Inventory Report of Statistics Canada tracks GHG emissions and compares emission intensities for various industries. The intensities are reported in CO₂-equivalent emissions per thousand current dollars of production in Table 33.

Table 33: GHG Emission Intensities For Various Industries, Canada, 2004¹⁴⁴

Industry	Emission Intensity T CO ₂ -equivalent/\$1000
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¹⁴² Excerpted from Table 2, “Energy Use in the Food System: A Summary of Existing Research and Analysis.” Center for Integrated Agricultural Systems, University of Wisconsin-Madison. Cited in Xuareb 2005.

¹⁴³ Heinberg and Bomford 2009: 2.

¹⁴⁴ Statistics Canada 2009: 35.

Crop and animal production	3.1
Pesticide, fertilizer, and other agricultural chemical manufacturing	4.0
Meat product manufacturing	1.9
Dairy product manufacturing	1.7

According to Statistics Canada (2009:35), crop and animal production emitted 3.1 tonnes of CO₂-equivalent emissions per thousand current dollars of production (T CO₂-eq/\$1000) in 2004. GHGs are also emitted during food-related manufacturing. With emissions of 4.0 T CO₂-eq/\$1000, ‘Pesticides, fertilizer and other agricultural chemical manufacturing’ had the highest emission intensity of the 56 secondary industries. Seven of the 12 food or beverage manufacturing industries ranked in the top 20: ‘meat product manufacturing’ was fifth at 1.9 T CO₂-eq/\$1000 and ‘dairy product manufacturing’ was seventh with emissions of 1.7 T CO₂-eq/\$1000. It should be noted that these are average figures for each industry that do not account for production system differences.

Like in Canada, US manufacturing of synthetic fertilizers and pesticides is one of the most energy-intensive parts of the agricultural production system, using 40% of all energy used in agriculture (Heller and Keoleian (2000) in Brodt, Chernoh & Feenstra, 2007). Table 34 lists the energy use for production of fertilizers and pesticides, including conversion losses and production and delivery energy (Carlsson-Kanyama and Faist 200?:25). Of the fertilizers, it is the production of N-fertilizers that are the most energy consuming with 40-63 MJ per kg of N produced. The corresponding values for P-fertilizers range from 10-39 MJ per kg P and for K-fertilizers from 5-12 MJ per kg K. Production of lime is in the range of 1-5 MJ per kg output. Energy use for production of pesticides may range from 118-400 MJ per kg active ingredient according to examples from pesticides used in wheat production (Audesley, 1997:34). Far smaller amounts of pesticide active ingredient are used, however, in comparison to fertilizers.

Table 34: Energy Used to Produce Fertilizers and Pesticides¹⁴⁵

	Energy Use in Production, Delivery, and Conversion Losses (MJ per kg)
Fertilizers	
Nitrogen	40-63 MJ per kg N
Phosphorous	10-39 MJ per kg P
Potassium	5-12 MJ per kg K
Lime	1-5 MJ per kg lime
Pesticides	
Pesticides used in wheat production	118-400 MJ per kg active ingredient

Food preparation is also very energy-consuming. According to Carlsson-Kanyama and Faist (200?:21), **cooking appliances** have various rates of energy use. Ovens, gas or

¹⁴⁵ Carlsson-Kanyama and Faist 200?:25

electrical, are more energy consuming than plates on stoves and much more energy consuming than microwave ovens. **Refrigeration**, in the home, in the store, or during storage and warehousing, is also very energy-consuming (see Table 35). Refrigeration accounts for at least half of the energy used in retail outlets. Waitrose, a UK grocery chain, calculates that 65% of its energy use is for refrigeration, Sainsbury's estimates that refrigeration is its main energy use, and an unnamed grocery chain in the UK estimates its energy use from refrigeration at 64% (Garnett, 2007; Monbiot, 2006). In the fruit and vegetable food chains, the transportation and refrigeration stages are the most greenhouse gas intensive (Garnett, 2006). These stages are inextricably linked, as food transported long distances is often refrigerated or frozen. Garnett (2008:45) notes that the presence of refrigeration has shaped the development of the sorts of foods we choose to eat, the way we shop, and the way we cook. Refrigeration is now considered to be essential. In a local food system, it is possible to keep food from spoiling by underground cold storage, drying, canning, pickling, and lactofermentation – all far less energy intensive. Cold room storage and lactofermentation require no energy use. These methods will likely become more popular again, as energy becomes more scarce and/or expensive. Long-term cold storage of apples may consume between 0.0017-0.0009 MJ electricity per kg per day. This low level of energy consumption means that even if apples are stored during one year, energy use does not exceed 0.7 MJ (Carlsson-Kanyama and Faist 2007:22).

Table 35: Energy Use for Freezing and Refrigeration¹⁴⁶

Appliance	Consumption of Energy
10-year old refrigerator	10 x more energy per L useable volume as a new one
10-year old freezer	0.029 MJ per L net volume per day
10-year old freezer	0.058 MJ per L net volume per day, 50% utilization
10-year old freezer	Storage time of 90 days, energy use = 5.2 MJ per L of food
New a-class freezer	0.012 MJ per L net volume per day
New a-class freezer	Storage time of 90 days, energy use = 1.2 MJ per L of food
Industrial refrigeration	0.0025-0.082 MJ electricity per L net volume, per day
Retail cold display cases	0.12 MJ per L net volume per day
Retail cold display cases	utilisation rate of 75 % and a storage time of one week, energy use exceeds 1 MJ per L
Industrial freezing	
- 10m ³ room	0.015 MJ energy use per L net volume per day
- 10,000m ³ room	0.0010 MJ energy use per L net volume per day

Another significant use of energy in the food system is **waste**. About a quarter of all food entering institutional and household distribution systems is lost (Garnett 2006; Carlsson-Kanyama and Faist 2007:14). Levels of waste are closely correlated with levels of income, with little end use food waste at low levels of income, but with 30-60 % of food requirements lost in high income countries (Bender, 1994). Another form of waste is to produce food products we do not need. According to Carlsson-Kanyama, et al (2003)

¹⁴⁶ Carlsson-Kanyama and Faist 2007:22

“[u]p to a third of the total energy inputs [in the food system] is related to snacks, sweets and drinks, items with little nutritional value”. It is worth repeating here that Pimental (2008:468) discusses how to reduce energy use in the US food system, and concluded that *reducing junk food consumption* would be the single most effective strategy. A 10% reduction in junk food consumption would strategically conserve energy and improve health. He concludes that reducing junk food consumption would be more effective than reducing food transport, improvements in food processing, or production technology improvements.

Some researchers have suggested that by **shifting our diets**, we can save considerable energy consumption (and related polluting emissions). Some suggest eating less meat and dairy (Weber and Matthews 2008; Carlsson-Kanyama et al 2003; Garnett 2008). It is also suggested we eat more in-season vegetables and more locally-produced and fresh foods (Carlsson-Kanayma 1998; Kramer et al. 1999; Brower and Leon, 1999; Jungbluth et al. 2000; Faist 2000; Sundkvist et al. 2001; Pirog et al. 2001) (in Carlsson-Kanyama, et al 2003: 294). If people switch to eating more fruit and vegetables, they should not be of the more energy-intensive varieties. The least greenhouse gas intensive fruits and vegetables are seasonal, field grown, local produce cultivated without additional heating or protection, which are not fragile or easily spoiled (Garnett, 2006:7). Overseas grown produce which is reasonably robust, cultivated without heating or other protection and which is transported by sea or short distances by road are also fairly low in their greenhouse gas intensity (Garnett, 2006:7).

Garnett (2008) summarizes what less-GHG intensive consumption in the UK would look like. Her list includes:

- Eating less meat and dairy
- Eating less (eating the recommended caloric intake, and not more)
- Eating seasonal, robust, field grown vegetables
- Cooking in bulk
- Shopping on foot or over the internet
- Not wasting food
- Accepting different notions of quality
- Accepting variability of supply
- Consuming fewer foods with low nutritional value
- Cooking and storing food in energy conserving ways.

Pimental (2008) discusses non-renewable energy used in the American food system and cites that 2000 L of oil per year per American are needed in the current food system. In terms of food production, he recommends renewable energy options; reduction in the dependence on irrigation; conserving essential nutrients through cover cropping, building organic matter in soil; and using manure; improving energy efficiency on farm through a reduction in pesticide use, mixed farming systems, and crop rotation; and reducing mechanization

It should be noted that all of these studies and recommendations are based on average energy consumption figures. For instance, one recommendation above is to reduce

consumption of meat and dairy products. It is possible that some people eat too many of these products, but in Nova Scotia, it may not make sense to replace locally-produced meat and dairy raised on pasture and hay, with soy and other imported industrial protein products. While average figures show that meat and dairy are energy-intensive and emit high amounts of greenhouse gases, those figures do not take into account grass-based production systems that are soil-building and carbon-conserving (Weber and Matthews 2008; Arsenault 2006). Details for Nova Scotia beef and lamb production are discussed in detail in the meat case study chapter.

Global sourcing studies

We want to know what to do to reduce energy and resource consumption, reduce costs, reduce polluting emissions, and reduce greenhouse gas emissions. Studies of the life cycle analysis (LCA) of food products, examining the energy use and emissions of each stage of a food's life cycle, can help us determine strategic choices to reduce our environmental impact. Some of those studies are discussed below and in the case study chapter. Below we review a comparison of international and local juice, lamb, and onion production. The results show that in some cases economies of scale in food production and distribution create energy savings that favour the maintenance of a global food system – particularly when goods are shipped in large boats.

Saunders et al (2006) compared energy used and CO₂ emissions between New Zealand (NZ) and United Kingdom (UK)-raised lamb. Their conclusion was that the energy used in producing lamb in the UK is four times higher than the energy used by NZ lamb producers, even after including the energy used to transport NZ lamb to the UK. Thus, NZ lamb CO₂ emissions are also considerably lower than UK lamb. The UK system used four times as much fuel, 12 times as much nitrogen fertilizer, and four times as much lime as the NZ system. Also the UK system used harvested forage, fodder, bedding, and cereal/concentrate feed while the NZ year-round range-fed lambs required none. Housing is also six times more emissions-intensive in the UK relative to NZ. Even when shipping is included, the CO₂ emissions were four times as much per tonne for UK as NZ. It can be argued that the study was biased to favour NZ production. The authors compared grain-fed intensive sheep production in the UK with extensive grass-fed sheep production in NZ. It is like comparing apples and oranges. Also, the CO₂ emission factors (kg CO₂ per tonne km) used in the study were much smaller than any of the ones used in the Transportation chapter, causing the transportation emissions to be underestimated. What we do learn from the study is that grass-fed lamb in a less populous southern climate is much more efficient than grain and forage-fed lamb in a more northern climate where storage and housing are required.

The same authors also compared milk, apples, and onions. Milk and apples from NZ were found to be less emission-intensive than UK milk and apples, even when emissions from shipping are included. Onions shipped to the UK from NZ were more emissions-intensive than onions grown in the UK for local consumption (Saunders et al 2006).

Another study (Schlich & Fleissner 2005) showed large-scale global shipments of food (especially by ship) are more efficient than local production. Economies of scale often make large industrial food production, processing, and distribution more energy efficient than local food systems. These authors studied production, transportation, manufacturing, and distribution of juice and lamb. They compared orange juice concentrate shipped from Brazil to Germany for dilution and filling in re-useable glass bottles, with apple juice concentrate from Germany and other neighbouring countries, also diluted in re-useable glass bottles. Results are presented in kWh per litre of juice. The small apple juice companies with up to 100 tons of fruit squeezing per year have an energy turnover range from 1.5 to 3.2 kWh/l. The larger orange juice companies have a range from 0.4 to 0.7 kWh/l. The specific energy turnover of fruit juices produced from small companies is higher than comparable fruit juices from companies with more than 2,000 tons per year. The study does show that regional business units, one producing 2,000 tons per year, using 0.7 kWh/l, is able to compete with large global businesses.

In the case of lamb, about 60% of the yearly consumption of lamb meat in Germany originates from New Zealand as frozen food, and about 40% comes from local German farmers. The energy study included production, slaughter, meat cutting, freezing, and transportation of the frozen meat to Germany. Like the Saunders et al (2006) study, German lamb requires more inputs than NZ lamb because of the need for shepherds, fencing, as well as winter housing, feeding, and watering. The difference is a function of climate and population density. The authors conclude that small farmers require more specific energy than bigger units. The New Zealand farmers are able to produce lamb meat with only small expenses of energy. The specific energy used is dependent on business size, and sea transportation takes less energy than local transportation and distribution efforts (Schlich & Fleissner 2005).

Again, with this German study, they are comparing two different things: large scale orange juice production from Brazil, with small-scale, local, apple juice production. Processing and distribution are also included. When large-scale global products are compared with smaller scale local products, the large-scale will most often be less energy-intensive per unit. Because it is bigger and can take advantage of economies of scale. It doesn't prove, however, that global sourcing of food is better than local sourcing. Two different variables are being evaluated together, and then conflated. If large-scale global and large-scale local products were being compared, the local ones would likely be the best choice. Another point is that in both the UK and German studies, ships are used to transport the food. Shipping is a very efficient method of transportation compared with trucking or even rail. If products requiring long-distance trucking were compared with local products requiring short-distance trucking, it is likely that the short distances would be more favourable, even when products from far away could be produced more efficiently.

In some instances (as shown in the Schlich & Fleissner (2005) juice comparison), *regional* food transport systems are more efficient than *local* ones. Hill (2008:5) showed that trucks supplying food locally have a smaller capacity, requiring more trips and

logging more miles for the same amount of food. In other instances, the local transportation system is much more efficient when the distances are very short. It is difficult to make broad generalizations and each food product needs to be evaluated on its particular mix of production, processing, and transportation used.

Conclusion -- Reducing Energy Use and Encouraging Efficiency

To effectively reduce our consumption of non-renewable fuels, and emissions of greenhouse gasses and other pollutants, the studies reviewed above strongly suggest the following:

- Reduce the consumption of junk food with empty calories;
- Where possible, replace the use of synthetic fertilizer, particularly nitrogen fertilizer, with local sources of nitrogen such as cover crops and animal manures;
- Refrigeration and freezing are very energy-intensive in the food system. These are particularly important for long-distance food transport. Low-energy alternative food storage and preservation methods can be used in a local food system;
- Reduce food waste because it accounts for one quarter of all food sold; and
- Shift diets to correspond to food available locally in season.

A conclusion from the LCA studies shows that in some cases, large-scale global food companies shipping products around the world can do so more efficiently (in terms of energy per unit product) than the local food system. The methodological problems with these studies are discussed above, but it should be recognized that economies of scale do provide some opportunities for energy efficiency.

Self Reliance

How much of the food we eat in Nova Scotia is actually produced here? How has this changed over time? At the heart of the discussion around relocalizing of food systems is the issue of what we can and do actually have the capacity to produce. Scott & Colman (2008) define self-reliance as follows:

Self-reliance may be defined as a community or region being largely able to provide for its own needs, and not immediately experiencing crisis if flows into the region are cut off for any reason. This is not the same as ‘self-sufficiency’—a term that generally implies little or no need for outside products or interaction even in normal circumstances. In a self-reliant community or region, flows of product, resources, people, and ideas are not only needed but welcomed, even while that community remains largely able to meet many of its own needs, create its own identity, build on its strengths, and use all of its inherent and adopted resources in an optimal manner (170).

To gain an understanding of our capacity to produce our own food in Nova Scotia, and to know how much of our diet is locally produced, we produced estimates of self-reliance for this province. This data is needed for the calculation of food miles, as well as being useful for its own sake. Unfortunately, there is no simple way to determine self-reliance and thus, we approached the problem from a number of different perspectives.

Imports as a Percentage of Net Supply – Canadian-Level Data

One measure of food self-reliance is the proportion consumed in Nova Scotia that is imported. Unfortunately, provincial-level data are not presently available.¹⁴⁷ At the national level, Table 36 clearly shows that—in every category—imports are rising relative to net supply. The contrast between the 1964 and 2006 results clearly shows Canada’s sharply expanded reliance on imported food in the past four decades.

Table 36: Imports As a Percentage of Net Supply, Canada, 1964–2006¹⁴⁸

	1964	2006
Fruit	67%	102%
Vegetables	20%	54%
Red Meat	3%	19%
Dairy	0.3%	1.7%

¹⁴⁷ Marcel Boudreau, Statistics Canada, *pers comm*. January 18, 2008. Mr Boudreau stated that Statistics Canada is unable to do a custom tabulation that would provide provincial-level data for this measure.

¹⁴⁸ Statistics Canada, Update table from *Canada Food Stats*, Sent by Marcel Boudreau, January 31, 2008. Original data from *Food Consumption in Canada* Catalogue No. 32-229.

Poultry	2%	17%
Eggs	0.5%	8%

In the ‘fruits’ category, we see that imports amounted to 102% of net supply in 2006, which seems to indicate we import more fruit than we eat. This result is due to the formula used for calculating net supply, which includes two items— waste and re-export—that tend to skew results upward. The formula is: *Net Supply = (Beginning Stocks + Imports + Canadian Production) minus (Exports (and Re-exports) + Waste + Manufacturing + Ending Stocks)*. Because of the inclusion of the waste and re-export components, this formula can yield results over 100%, despite the fact that Canada produces fruit consumed domestically.

Data in Table 36 indicate clearly that food imports are going up over time. Even imports of red meat, which Canada is capable of producing in ample quantities year-round, have grown in the last 41 years from 3% to 19% of all red meat consumed in the country. For the supply-managed sectors, such as dairy and poultry products, imports have remained low. But Table 36 shows that, *even in these protected areas*, imports have gone up over time—quite dramatically in the case of poultry (from 2% in 1965 to 17% in 2006).

Data are also available for individual products from 1960 to 2006. Figures 16 to 19 show selected items, with black trend lines. In all cases, except lamb, the trend shows increasing imports. These items were chosen because they are foods we can grow here, they have not been subject to food fad trends (i.e. there’s been steady regular consumption), and Canadian growers can make these products (with the exception of strawberries) available year-round

Figure 16: Imports as a % of Net Supply, Carrots & Onions, 1960-2006¹⁴⁹

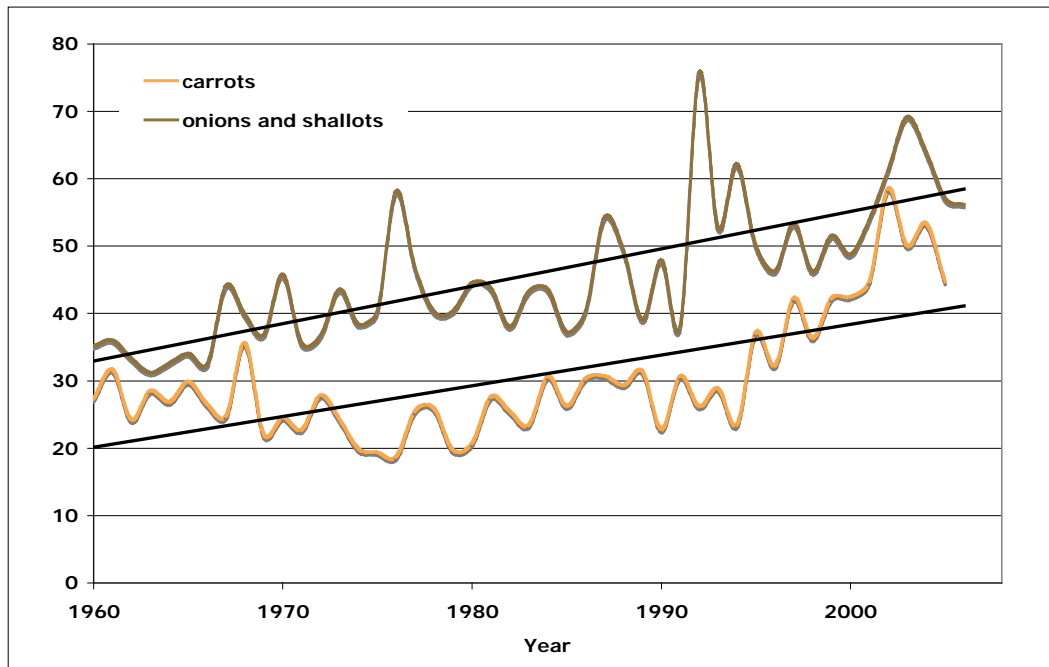
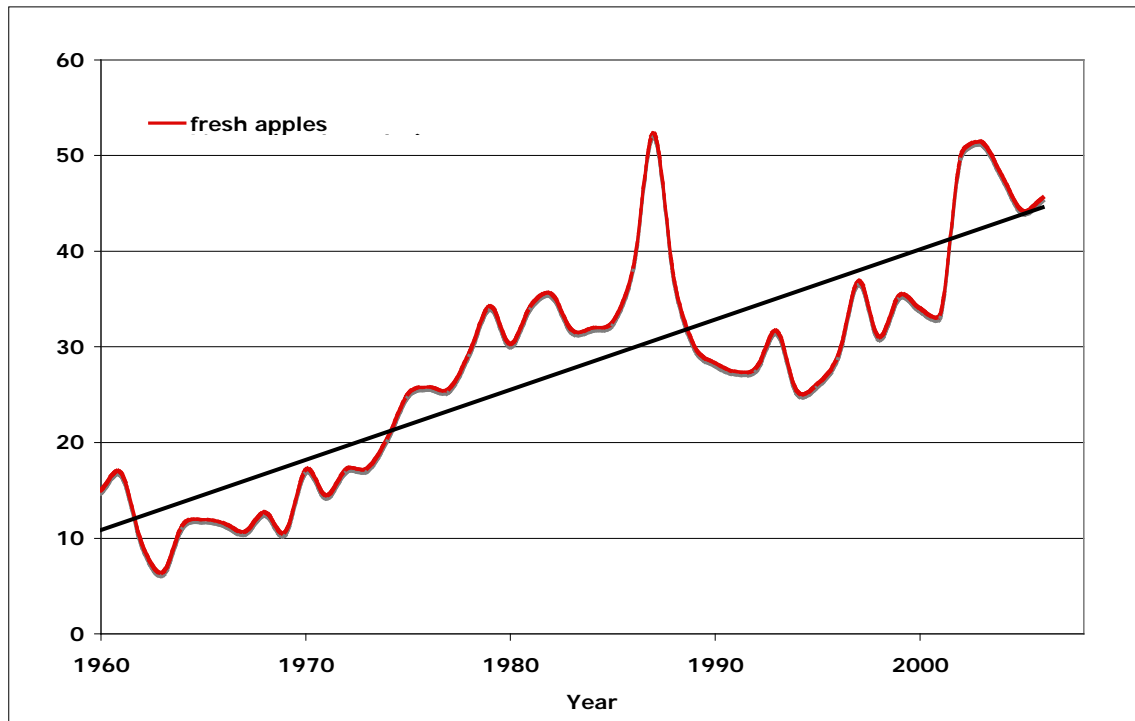


Figure 17: Imports as a % of Net Supply, Fresh Apples, 1960-2006



¹⁴⁹ Data for Figures 16 to 19 are from Statistics Canada, CANSIM table 002-0010. "Net supply" and "imports" columns were selected, then divided imports into net supply (*100) to get imports as a % of net supply.

Figure 18: Imports as a % of Net Supply, Fresh Strawberries, 1960-2006

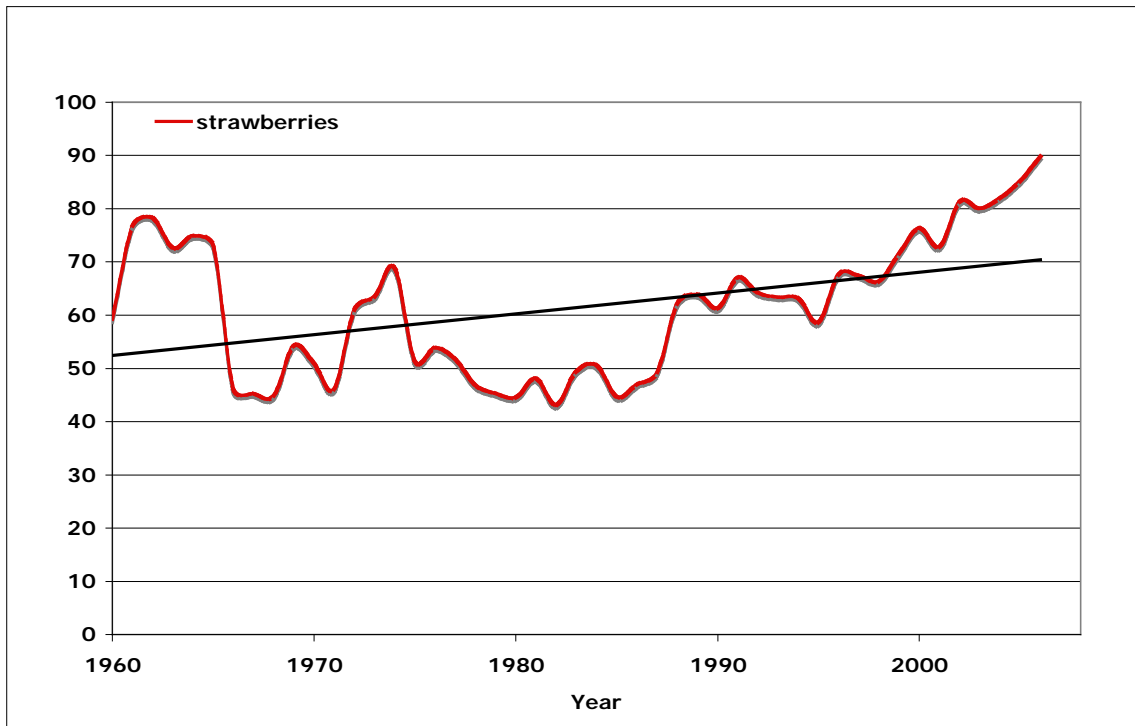
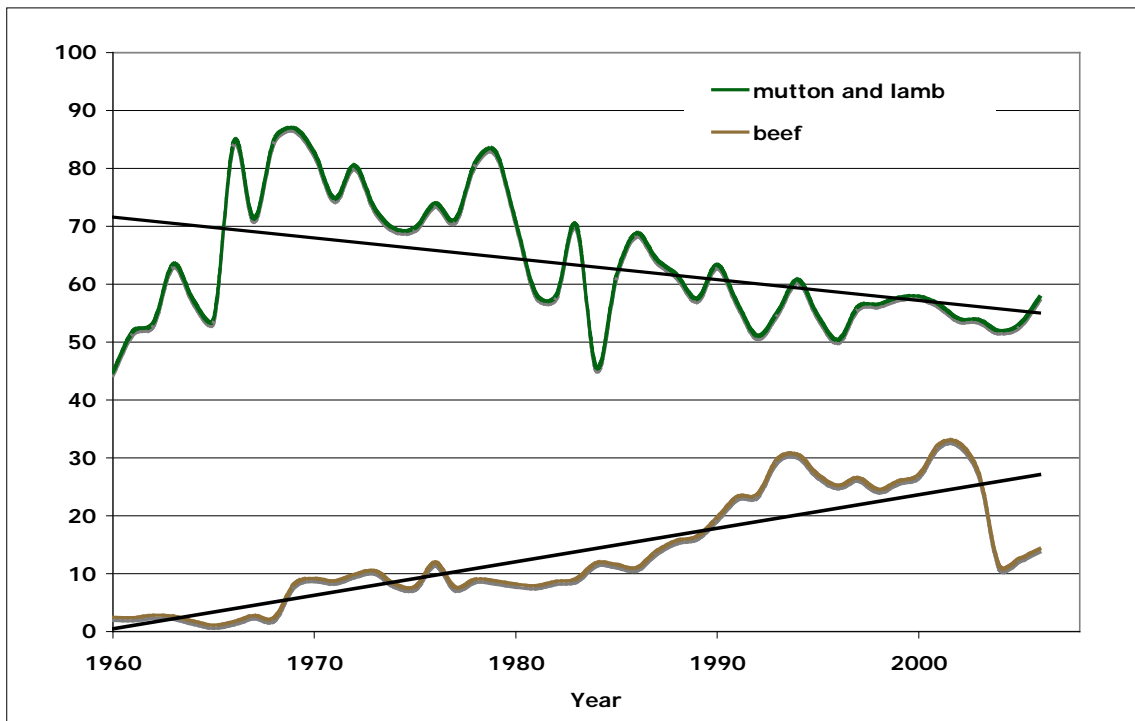


Figure 19: Imports as a % of Net Supply, Lamb & Beef, 1960-2006



Percentage of Grocery Sales from Atlantic Canadian Vendors

Another way to determine how much of our diet is locally-grown is to look at the percentage of grocery store stock from Nova Scotia. Requests for this data in 2006 were denied¹⁵⁰. Data for Atlantic Canada became available and although it was not exactly what we were seeking, it was the closest we could get. The Canadian Council of Grocery Distributors (CCGD), representing large Canadian food distributors,¹⁵¹ did a member survey in May 2007 that provided Atlantic Canadian information on the portion of large grocery retailers' purchases from Atlantic Canadian suppliers (growers and processors) (Jeanne Cruikshank, pers.com, January 21 2008). Unfortunately there are no data compiled for previous years, so trends in regional food purchases cannot be assessed. Tables 37 and 38 show grocery store purchases by CCGD stores from Atlantic Canadian growers and processors. Raw ingredients for locally processed goods may or may not originate in Atlantic Canada. Co-op Atlantic percentages, as provided in Co-op Atlantic literature, are shown separately, since they are significantly higher than the grocery retail average.

Table 37: Portion of Grocery Retailers' Purchases from Atlantic Canadian Suppliers (Growers and Processors), 2007¹⁵²

Grocery department	Average of leading retailers including Superstore, Sobeys, Co-op Atlantic	Co-op Atlantic¹⁵³
Meat	23%	63%
Produce	18%	32%
Dairy	50%	54%
Seafood	40%	61%
Frozen	47%	57%
Bakery	61%	75%
Deli	36%	75%
Packaged goods	10%	22%

Table 37 shows a surprisingly small amount of stock is coming from Atlantic Canada. Even in a supply-managed sector such as dairy, we find only 50% is local. The highest percentage of local stock is in the bakery section, but likely most of the ingredients for

¹⁵⁰ Julia Kemp of the Ecology Action Centre made these requests.

¹⁵¹ This Canadian Council of Grocery Distributors (CCGD) represents large Canadian distributors and marketers of food and grocery related products (four or more stores), and accounts for more than 80% of food distribution volume in Canada. Atlantic Canadian members include Atlantic Wholesalers, Sobeys's, Costco, Coleman's, and Co-op Atlantic. Jeanne Cruikshank, CCGD. Presentation to Council of Atlantic Premiers. 12 January, 2006. Available at: <http://www.ccgd.ca/home/en/pdf/presentations/council%20of%20atlantic%20premiers%20jan%2012%202006.pdf>. Accessed 20 July, 2008.

¹⁵² Canadian Council of Grocery Distributors; the Co-op Atlantic column is from Co-op Atlantic flyer.

¹⁵³ Thanks to Lynn Sawyer for this information.

the baked goods are from outside the region. The Co-op Atlantic percentages are considerably higher than the average of all the leading retailers.

Table 38: Portion and Dollar Amount (\$2007) of Grocery Retailers' Purchases from Atlantic Canadian Suppliers (Growers and Processors)¹⁵⁴

Total For Canadian Council of Grocery Distributors Stores		
Department	\$ Value of Purchases from Atlantic Canada Vendors	Atlantic Canada Vendor Purchases As % of Total
Dairy	\$229,724,932	49.7%
Meat	\$128,576,277	22.6%
Produce	\$65,664,706	17.7%
Seafood	\$25,708,641	40.0%
Deli/HMR	\$34,742,775	35.3%
Bakery	\$92,668,146	60.9%
Frozen	\$91,113,354	47.3%
Packaged Goods	\$126,797,873	9.7%
Total	\$794,996,704	24.7%

Dollar values in Table 38 show that 25% of vendor purchases are from Atlantic Canada. It is impossible to tell what percentage of those purchases are foods grown on Atlantic Canadian farms.

The CCGD (no date: 2) notes that “the grocery channel is best characterized as being highly concentrated and fiercely competitive. As a result, industry players have pursued significant change to secure cost efficiencies and competitive advantages relative to one another.” The grocery industry has become increasingly consolidated over the last ten years. As can be seen in Table 39, three major players, control 78% of grocery channel sales. This means that on the one hand, they have to source food in a way that allows them to be very competitive. That is, they have to get the lowest cost items possible while still attracting customers to their store. On the other hand, the stores with the largest shares of the Atlantic Grocery Business wield considerable market power. This means that suppliers don’t have much choice when they are offered a price for their goods.

¹⁵⁴ Canadian Council of Grocery Distributors.

Table 39: Share of Atlantic Grocery Business, 2007¹⁵⁵

Grocery Store	Share of Atlantic Grocery Business
Atlantic Wholesalers (Loblaws) AKA Superstore	37%
Sobeys	32%
Co-op Atlantic	9%
Total	78%

Retail food dollar as a proportion of retail food consumption

Another way to estimate Nova Scotia's level of food self-reliance is to look at production relative to consumption and use 'retail spreads' estimates from the US to determine the retail value of the raw farm products. Roberts et al (2005) estimate that the NS agricultural industry produces approximately half of the retail value of food consumed in Nova Scotia. This estimate is derived as follows:

- Nova Scotian households spent approximately \$2.2 billion on food in 2003 (\$6,137 per household x 360,960 households)
- 77.6% of Canadian food purchases are made in grocery stores, with the remainder in restaurants. Thus \$1.7 billion spent in grocery stores and \$500 million in restaurants
- The retail value of NS agricultural products is \$1.2 billion (estimate based on the proportion of the retail food dollar that the farmer receives at farm gate)
- NS food exports are valued at \$190 million
- Thus, after exports have been accounted for, the retail value of NS agricultural products is approximately half of the \$2.2 billion spent on food.

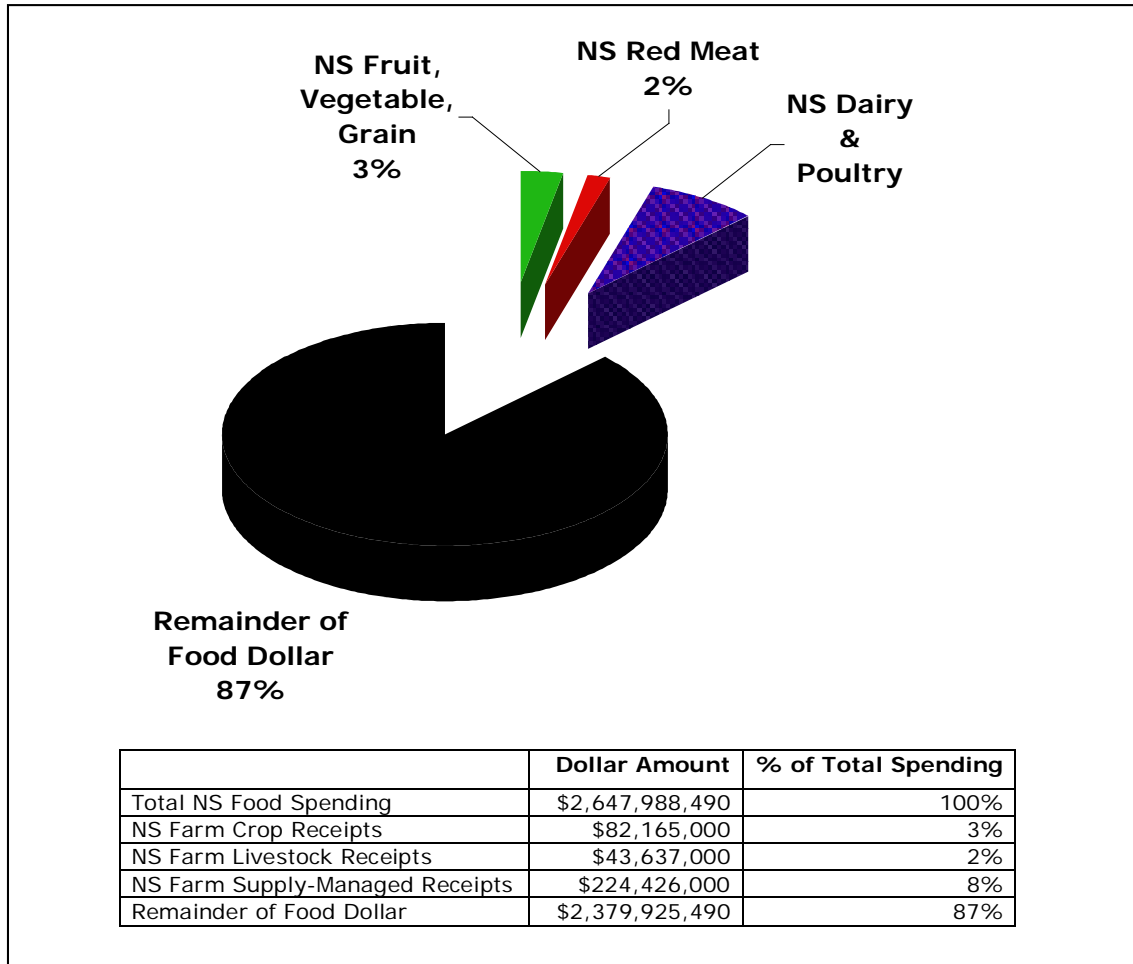
There are two potential problems with this estimate. One is that the retail spread estimates from the US may not be valid in Canada. The second issue is that the more recent Canadian Council of Grocery Distributors estimate, in Table 38, shows purchases from Atlantic Canadian suppliers at 25%. As discussed above, this amount is very likely an overestimate of self-reliance because it counts products that are manufactured here but do not have ingredients originating from our farms. Therefore, the 25% estimate is on the high range of any estimate of self-reliance. Finally, it would be difficult to convince any shopper that 50% of the products in any given grocery store are from Nova Scotia.

As is detailed in the chapter on Economic Benefits and the Food Dollar, the pie chart in Figure 20 shows the proportion of the food dollar spent that Nova Scotia farms earned in 2008 – about 13%. Farms in Nova Scotia earned the equivalent of 8% of total food spending, for supply managed products (dairy, poultry, & eggs). This is the lion's share of the local food Nova Scotians are eating. Non-supply managed sectors such as

¹⁵⁵ AC Nielsen Homescan, reported in Canadian Grocer, 2006/7 Executive Report

vegetables and fruit, and red meat earned the equivalent of 3% and 2% of the food dollar, respectively.¹⁵⁶ Most of the food dollar – 87% -- is not going to Nova Scotia farms.

Figure 20: Food Spending Relative to Farm Cash Receipts, Nova Scotia, 2008¹⁵⁷



Production as a percentage of consumption

Another way of examining self-reliance is through production and consumption data.

The 1984-85 Annual Report from the PEI Department of Agriculture contains a table entitled the Prince Edward Island Commodity Supply and Consumption Balance Sheet

¹⁵⁶ Again, 13% of the amount that is spent on food is a high estimate for the earnings of farms in this province. The estimate would have to be adjusted to account for international and interprovincial exports of livestock and crops.

¹⁵⁷ Derived by removing all non-food items such as furs, flowers, and Christmas trees from the table of Nova Scotia total farm cash receipts in Statistics Canada’s Farm Cash Receipts – Agriculture Economic Statistics series. Cat. No. 21-011-X. Latest Update: May 2010.

(Table 40). This table contains estimated production and consumption figures for food products produced on PEI. From these figures, a surplus or deficit was calculated.

Table 40: Prince Edward Island Commodity Supply and Consumption Balance Sheet, 1984-85¹⁵⁸

Commodity	Unit	Total Estimate Provincial Supply	Total estimate Provincial Consumption	Self-sufficiency	Surplus or (deficit)
Asparagus	lbs	0	84,000	0%	-84,000
Beans	lbs	70,000	650,000	11%	-580,000
Beets	lbs	2,900,000	207,000	1401%	2,693,000
Cabbage	lbs	3,500,000	221,000	1584%	3,279,000
Carrots	lbs	1,687,500	2,727,000	62%	1,039,500
Cauliflower	lbs	240,000	775,000	31%	-535,000
Celery	lbs	0	1,210,000	0%	-1,210,000
Sweet Corn	lbs	270,000	2,740,000	10%	-2,470,000
Cucumber	lbs	430,000	720,000	60%	-290,000
Lettuce	lbs	360,000	2,590,000	14%	-2,230,000
Onions	lbs	0	1,873,000	0%	-1,873,000
Parsnips	lbs	200,000	39,000	513%	161,000
Peppers	lbs	0	550,000	0%	-550,000
Radish	lbs	0	151,000	0%	-151,000
Rutabaga	lbs	9,100,000	630,000	1444%	8,470,000
Tomatoes	lbs	60,000	2,050,000	3%	-1,990,000
Strawberries	lbs	1,600,000	501,000	319%	1,099,000
Blueberries	lbs	750,000	45,000	1667%	705,000
Cranberries	lbs	36,000	95,000	38%	-59,000
Potatoes	cwt	17,616,000	184,550	9545%	17,431,450
Brussel Sprouts	lbs	450,000	115,000	391%	335,000
Broccoli	lbs	350,000	572,000	61%	-220,000
Eggs	doz	3,031,000	2,243,708	135%	787,292
Chicken	lbs	1,014,000	5,093,000	20%	-4,079,000
Turkey	lbs	13,000	1,106,000	1%	-1,093,000
Lamb	lbs	55,000	652,000	8%	-597,000
Pork	lbs	30,163,000	7,809,000	386%	22,354,000
Beef	lbs	20,930,000	10,729,000	195%	10,201,000
Fluid Milk	litres	13,515,000	13,515,000	100%	0

The information in Table 40 is exactly the kind of information that would be so useful to producers and consumers interested in self-reliance and market opportunities. If this table was constructed every year as part of annual reporting, we would have a much better idea of progress (or lack of it) over time towards the goal of more self-reliance. We adjusted the products over 100% in the self-sufficiency column to 100%, assuming that any amount produced over the amount consumed was sold elsewhere. The total

¹⁵⁸ PEI Department of Agriculture. 1985. Annual Report.

weight in the provincial supply column was divided by the total weight in the provincial consumption column to get a result of 75.6%. For the products listed in this table, PEI was 75.6% self-sufficient. This of course does not count other products such as corn flakes or oranges, so it is not an overall estimate of food self-reliance.

In 2006, the British Columbia Ministry of Agriculture and Lands conducted a study entitled *B.C.'s Food Self-Reliance: Can B.C.'s Farmers Feed Our Growing Population?* In this study, the term self-reliance refers to the percentage of BC consumption that is produced in BC (production divided by consumption). Food being exported from the province is not taken into account. Using production and consumption data from 2001, it was determined that BC is 48% self-reliant on average across all food groups, and 56% self-reliant in foods that can be economically grown in BC. However, when production is compared to consumption recommended in *Canada's Food Guide to Healthy Eating*, self-reliance decreases to 34%. The self-reliance estimate is lower because *recommended* consumption of fruits and vegetables is higher than *actual* consumption. This study focuses on land-based food; however, the authors note that if seafood was taken into account, self-reliance increases to 53% from 48% and self-reliance for food that can be economically produced in BC increases to 61% from 56%.

BC Ministry of Agriculture and Lands (2006) also estimates that with present techniques, 0.524 hectares of farmland are needed per person to produce food for one year. If we use this figure for Nova Scotia, we would need $(939,125 * .524) 492,102$ hectares of land in production. Presently, we have 140,000 hectares in crops and tame pasture and a total of 403,044 hectares in farmland (this includes wood land, barnyards, wetlands, rivers, and natural pasture). In the province, we have 1,149,194 hectares of Class 2 and 3 land (most suitable for agriculture), thus there is a lot of potential for meeting most of our food needs. However, it is unknown how much of that land has been converted to residential, golf course, and other uses.

Using similar methodologies as the studies noted above, self-reliance data was calculated for Nova Scotia. Production data, per person food consumption, and population figures were obtained through Statistics Canada. Production was divided by fresh consumption to obtain the figures in the second column of tables below. The third column for vegetables and fruit reflects production divided by both fresh consumption and processed consumption (fresh equivalent weight), where available. In an effort to obtain information that reflected certain realities of agriculture in Nova Scotia, a fourth column was added which contained estimates from growers, Department of Agriculture employees, and others involved in the agriculture industry as to the percentage of NS consumption that was locally produced.

For more detailed tables, showing self-reliance over time, see Appendices.

Table 41: Nova Scotia Vegetable Self-Reliance 2008¹⁵⁹

Crop	Production divided by Fresh Consumption	Production divided by Fresh & Processed Consumption	Percentage of NS consumption that is locally produced (estimate)
Asparagus	1%	1%	
Beans	22%	10%	
Beets	45%	51%	
Cabbage	184%	-	90-100% of supply from July to April from Maritimes
Carrots	652%	476%	8 months of year all are from Maritimes Close to 100% from July to April
Cauliflower	35% ¹⁶⁰	32% ¹²	
Celery	0%	-	No commercially produced celery in NS
Corn (sweet)	35%	13%	
Cucumbers (field only)	4%	-	
Lettuce	1%	-	
Onion (Dry)	95%	-	85% from August to June (Maritimes) 90-100% August to April from Maritimes
Parsnips	14% ¹⁶¹	-	
Peas	22%	3%	
Peppers	1% ⁴	-	
Potatoes	97%	42%	
Radishes	0%	-	
Rutabagas & Turnips	127%	-	All turnips from Maritimes 90-100% From July to April from Maritimes

¹⁵⁹ Derived from CANSIM tables 001-0013 and 001-0014 and the Canada Food Stats Database 23F0001XBB.

¹⁶⁰ 2003 data, as this is the most recent data available

¹⁶¹ 2004 data, as this is the most recent data available

Spinach	8% ¹⁶²	5% ¹⁴	
Tomatoes (field only)	2%	-	
Total Tomato (incl Greenhouse)	24% ¹⁴	6% ¹⁴	

While the production divided by consumption figures for some vegetables, such as carrots, corn, onion and turnips, has remained relatively consistent since the early 1990s, most other vegetables are experiencing a downward trend. The most dramatic are beans and peas, due to the closure of the Avon Valley canning facility in Berwick in 2004; however, beets, cauliflowers, cabbage, cucumbers and parsnips are all decreasing as well.

Figure 21: Carrots and Corn: Production divided by Fresh and Processed Consumption (NS)

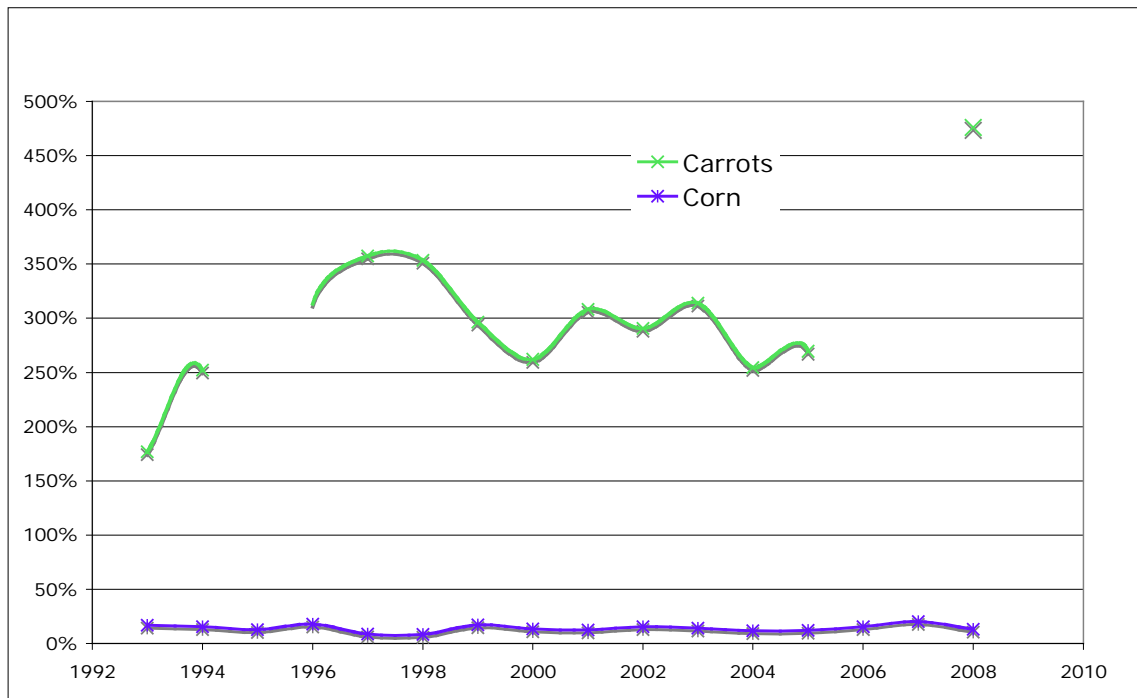


Figure 22: Beans and Beets: Production divided by Fresh and Processed Consumption (NS)

¹⁶² 2007 data, as this is the most recent data available

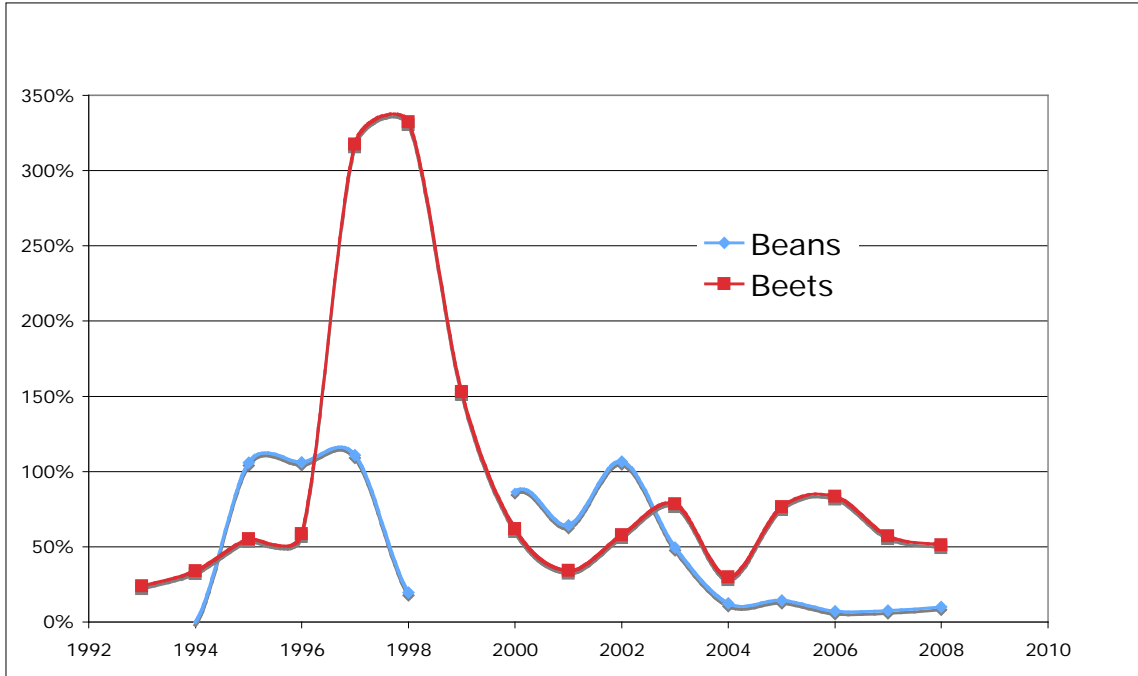
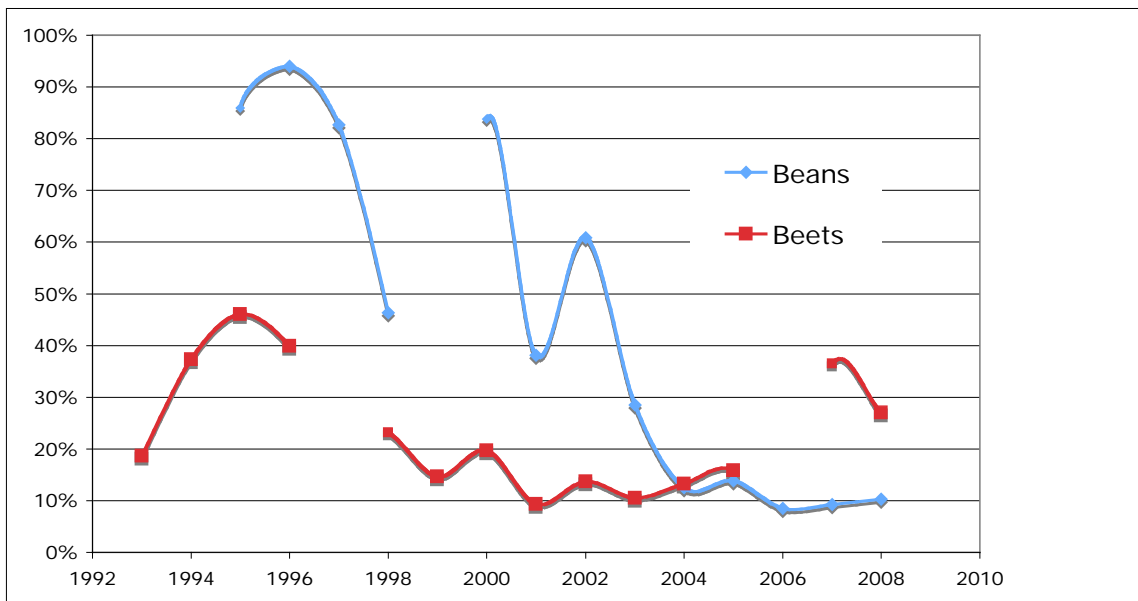


Figure 23: Beans and Beets: Production divided by Fresh and Processed Consumption (Maritime)



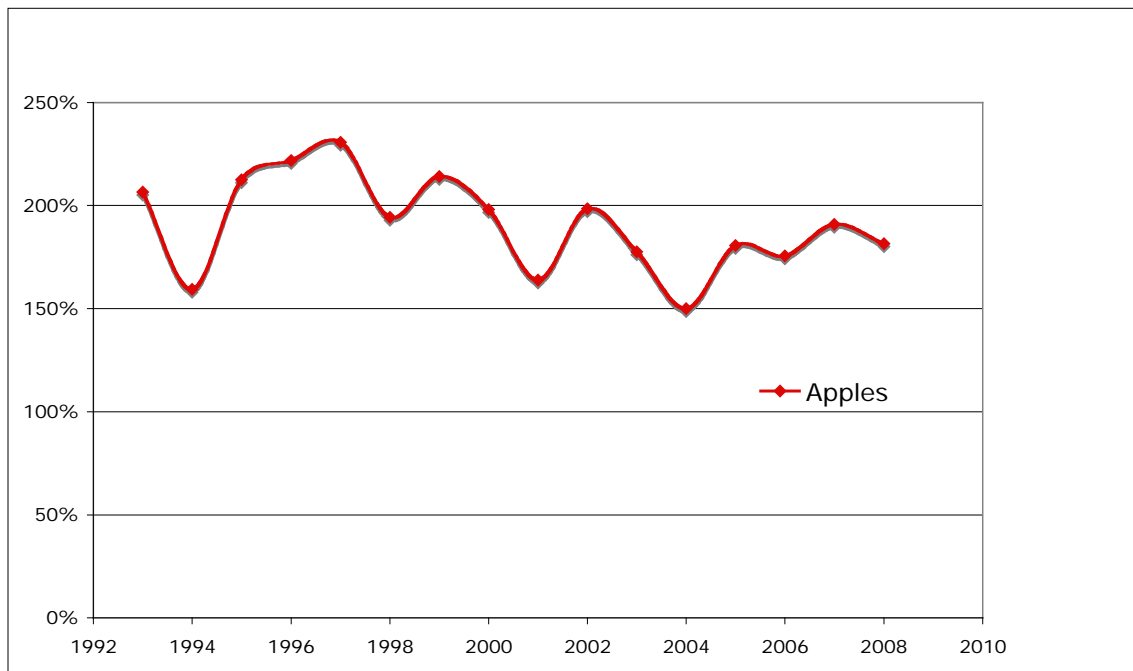
Similar data was produced for fruit in Nova Scotia. Discussions with producers and wholesalers in the apple industry resulted in the estimate in column 4. No similar estimates were available for the other fruits.

Table 42: Nova Scotia Fruit Self-Reliance 2008¹⁶³

Crop	Production divided by fresh consumption	Production divided by fresh and processed consumption	Percentage of NS consumption that is locally produced (estimate)
Apples	390%	182%	40 - 60%
Blueberries	1832%	1104%	
Peaches	7%	4%	
Pears	23%	20%	
Plums & Prunes	14%	-	
Strawberries	38%	32%	

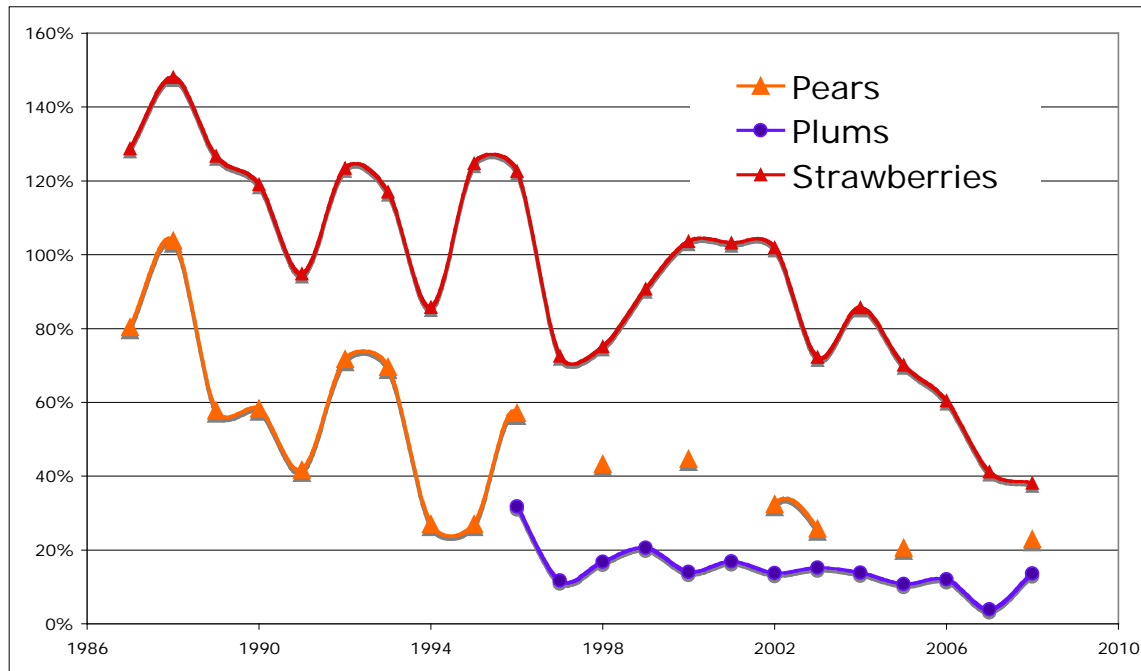
Apples and blueberries are major export crops, though both have seen downward trends in self-reliance in recent years. Blueberry production spiked from 1995-2000, and has been decreasing since. Numbers for pears, plums and strawberries have been decreasing, though peach numbers have generally remained steady.

Figure 24: Apples: Production divided by Fresh and Processed Consumption (NS)



¹⁶³ Derived from CANSIM tables 001-0009 and the Canada Food Stats Database 23F0001XBB.

Figure 25: Pear, Plums, and Strawberries: Production divided by Fresh Consumption (NS)



Self-reliance estimates were also produced for livestock. In column two, the slaughter number from Statistics Canada represent animals raised in Nova Scotia and slaughtered either inside and outside of the province. Whereas, in column three, researchers attempted to determine from other sources, the number of animals slaughtered within the province, or, in the case of beef, within the Atlantic region.

Table 43: Nova Scotia Livestock Self-Reliance 2007

Livestock	Production divided by Consumption (based on Stats Canada slaughter numbers)	Production divided by Consumption (based on slaughter numbers from other sources)	Percentage of NS consumption that is locally produced (estimate)
Pork	56%	52% ¹⁶⁴	
Chicken	117%	--	
Beef	27%	12% ¹⁶⁵	1-5%
Sheep & Lamb	25%	17% ¹⁶⁶	

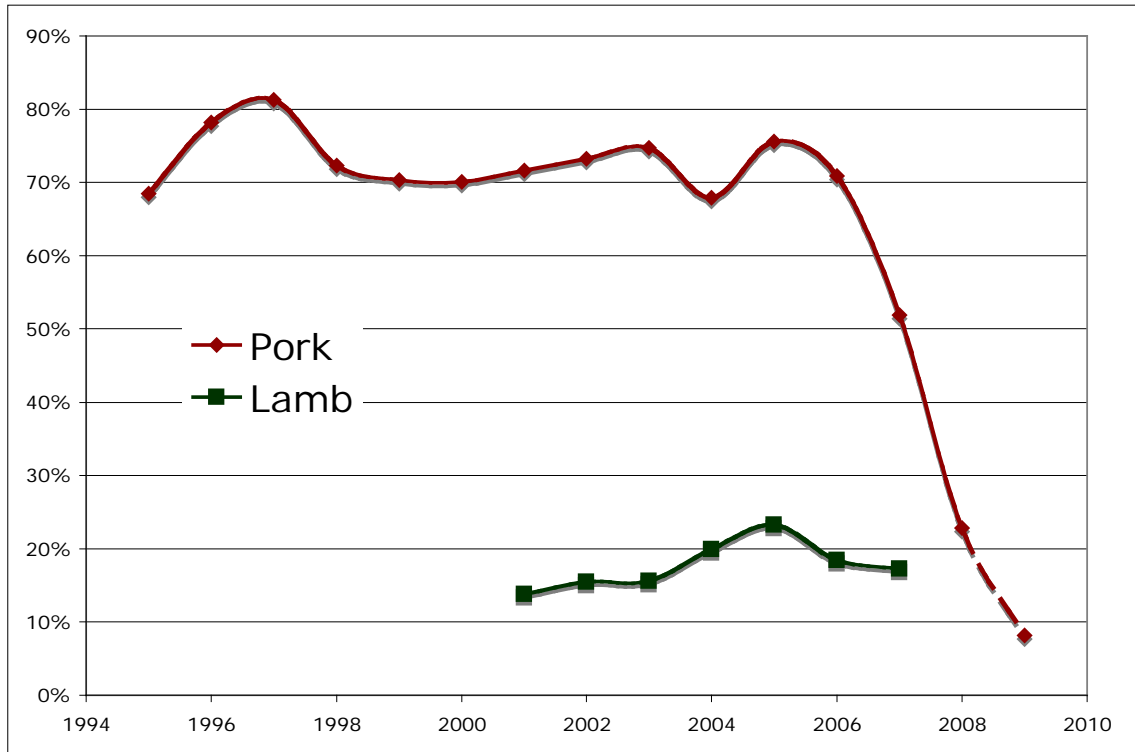
¹⁶⁴ Production data (slaughter numbers) from Pork NS

¹⁶⁵ This an Atlantic figure, based on beef production in all four Atlantic provinces, divided by slaughter number from all provincially inspected plants and an estimate of slaughter at the federally inspected plant in PEI. Provincial data from Agriculture and Agri-Food Canada, Provincial Slaughter - Annual Report (A009E). Federal data based on estimate from cattle farmer.

¹⁶⁶ Production data from Agriculture and Agri-Food Canada. 2007. Atlantic Provinces Weekly Livestock Market Report, for the week ended Dec 29, 2007.

Pork and beef data show a decrease in production divided by consumption – a very dramatic decrease in the case of pork, which had been relatively constant from 1995 to 2006. The dashed line in the graph below represents the estimated decrease in pork production for 2009. Due to the supply management system, chicken figures remain steady. Lamb also appears to be steady.

Figure 26: Pork & Lamb: Production divided by slaughter within Nova Scotia



Conclusion

Through conversations with growers, Department of Agriculture employees, and others involved in the agriculture industry, it was found that the production divided by consumption figures often did not reflect the reality of agriculture in Nova Scotia. Due to export or other reasons, the percentage of supply that was actually from Nova Scotia was considerably smaller.

Additionally, we found that production divided by consumption did not capture redundant trade. For example, even though we produce more than 100% of the chicken we consume, we do not consume it all here. A significant percentage of the chicken we produce here is shipped to New Brunswick for processing, and may or may not return to Nova Scotia for consumption, and an unknown percentage of the chicken we consume here is from elsewhere.

Many agricultural products are distributed on a Maritime basis. The production divided by consumption figures may show a relatively small self-reliance figure for Nova Scotia for a product that we could easily produce here. However, when the Maritime figures are examined, self-reliance is considerably higher. One such example is the production divided by consumption figure for cabbage. In NS, it ranged between 27% and 44% for 2004 to 2007. However, the Maritime figure ranges between 47% and 75% over the same time period. This is consistent with estimates from growers.

We noted that the self-reliance figures varied widely depending on the method of calculation used. This points to a need for better data collection. How can we improve our self-reliance if we do not know what we are aiming for?

Given the various calculations of self-reliance for Nova Scotia, there is a general downward trend in self-reliance (outside of supply managed commodities). However, the numbers also indicate great potential for producing more of our food – if it were economically viable. The following chapter, Distance Traveled and Emissions of a Food Basket, we will examine 66 commonly eaten food items in more detail, including where the items are currently being produced, if we are producing or could produce them in the province, and what types of food items we are not producing here.

Distance Traveled and Emissions of a Food Basket

How far does our food travel? What are the transportation emissions associated with eating food from around the globe?

In order to calculate the distance food is traveling, we chose to use the National Nutritious Food Basket (NNFB) tool, which was developed by Health Canada as a method of measuring the cost of a basket of food (Lawn, 1998). The NNFB contains 66 food items, from 11 different food groupings which reflect the eating habits of Canadians, these foods also, in appropriate combinations and amounts, were designed to meet the nutritional needs of Canadians according to the 1992 Canada Food Guide.

We attempted to calculate average distance traveled for each of the 66 items and the GHG emissions associated with their travel. Some items, however, were excluded due to lack of data or other difficulties. What follows is the methodology, tables of the weighted distances and emissions, a summary from each section of food items and a discussion of the items therein.

Methodology

In order to estimate the distance traveled by the 66 items in the NNFB, and the resulting greenhouse gas emissions, and to inform the NNFB discussion below, the following data sources were used:

- Imports as a percentage of net supply. Statistics Canada keeps a record of imports of specific food products, as well as net supply. Information is available from the Canada Food Stats Database (Catalogue No. 23F0001XBB) available at <http://www.statcan.gc.ca/bsolc/olc-cel/olc-cel?catno=23F0001XBB&lang=eng>. The imports as a percentage of net supply was calculated using this data.
- The Strategis Database. (http://www.ic.gc.ca/sc_mrkti/tdst/tdo/tdo.php?lang=30&productType=HS6) This database is maintained by Industry Canada, using data from Statistics Canada and the US Census Bureau. Import data from this database was used, in particular the percentage of imports coming from each country and US state.
- Nova Scotia/Maritime self-sufficiency data. This data was calculated using production numbers of specific products and per person availability data. The availability data was multiplied by the population of Nova Scotia and the Maritimes. Production data was divided by availability (consumption) to obtain the self-sufficiency rate. Production data was calculated from the following sources:
 - Fruit (except where specified below): CANSIM table 001-0009
 - Vegetables (except where specified below): CANSIM table 001-0013
 - Potatoes: CANSIM table 001-0014
 - Pork (slaughtered): Pork NS

- Beef (slaughtered): Federally inspected meat estimate of 300 head per week. Provincially inspected meat data from Provincial Slaughter Annual Report, A009E, Red Meat Market Information, Agriculture Canada available online at http://www.agr.gc.ca/redmeat/sla-aba_eng.htm
- Chicken (slaughtered): Nova Scotia Agricultural Statistics: 2008, table 13
- Broccoli, Greenhouse Tomatoes and Greenhouse Cucumber: Fruit and Vegetable Production (Catalogue no. 22-003-X) Vol 76, No. 2
- Dairy Products: The Processing Sector: Production and Sales of Dairy Products, AAFC-AID, Dairy Section available at <http://www.dairyinfo.gc.ca/pdf/The%20Processing%20Sector.pdf>
- Provincial production data. Statistics Canada publishes production data for a variety of products on a provincial basis. The percentage of the Canadian supply of various products coming from each province was calculated from these numbers. Production data was calculated from the following sources:
 - Fruit and Vegetable Production (Catalogue no. 22-003-X) Vol 76, No. 2
 - Field Crop Reporting Series, Catalogue no. 22-002-XIE, December 2007
 - Dairy Products: The Processing Sector: Production and Sales of Dairy Products, AAFC-AID, Dairy Section available at <http://www.dairyinfo.gc.ca/pdf/The%20Processing%20Sector.pdf>
- Personal Communication with producers and other industry professionals. We contacted producers and other industry professionals to obtain their estimates of the provincial supply and their percentage of the market share.
- Grocery store survey. In November and December 2007, volunteers visited grocery stores and telephoned customer service agents in an attempt to determine the origins of products found in those stores.

Data from all data sources does not exist for all 66 NNFB items. Please see the chart (in appendix) to see which data sources were available for each product.

Using cucumbers as an example food item, the following paragraph explains how the above sources of data were used to calculate the average distance traveled for each of the 66 items in the NNFB:

For cucumber, imports as percentage of net supply were calculated. Imports were found to be approximately 30% of net supply. Using Strategis, we calculated the percentage coming from each exporting country and US state, and determined how much of that 30% was coming from each location. The remaining 70% is estimated to be originating in Canada. NS self-sufficiency for 2007 was calculated to be approximately 9%, and it was assumed that cucumbers grown in NS were staying in the province. The remaining 61% was assumed to be coming from other Canadian provinces, and was allocated based on Canadian production data. In this case, 55% was estimated to be coming from Ontario and 6% from Quebec. The results of our personal communication with growers and the grocery store surveys were used to determine if our numbers were accurate. If it was suggested that the amount of a given product found in NS stores was different than the calculated self-reliance data, the estimates given by growers or other industry professionals was used.

For products originating in Canada and the United States, distances were calculated from provincial or state capital cities. For products originating in Mexico, the distance was calculated from Mexico City. It was assumed that all North American products, except wheat and oats, were traveling by truck. Distances were determined using Google Maps (<http://www.google.com/maps>). Wheat and oat products were assumed to be traveling from the Prairies to Toronto by rail and then by truck from Toronto to Halifax. The reason for this is that processing was assumed to be done in Toronto and processed goods assumed to be traveling by truck. For Nova Scotia products, we estimated a distance of 350 km for travel within the province. To estimate travel distances for food items imported from all other countries, it was assumed that the products were traveling by ship. We used Maritime Chain (<http://www.maritimechain.com>), an online port distance calculator, to determine distances from the port of the originating country to the port of Halifax.

In the case of goods processed in Canada, but outside Nova Scotia (e.g. baked beans, tomato juice), it was assumed that the product was manufactured in Toronto, unless we had data to the contrary. In these cases, we calculated the distance that the raw ingredients would travel to Toronto and then the distance that the final product would travel to Halifax.

Once travel distances were estimated for each of the NNFB food items, we calculated the greenhouse gas emissions associated with this travel using emission factors from the Greenhouse Gas Protocol (World Resources Institute, 2008)

Table 44: Emission factors for different modes of transportation

Mode	Kg CO₂ equivalent per tonne-kilometre shipped
Truck	0.204
Rail	0.017
Domestic-Air	2.071
Short Haul-Air	1.439
Long Haul-Air	0.665
Ship	0.222

Results

Table 45 shows the weighted average¹⁶⁷ distance and emissions of each of the products in the NNFB in 2007. Also shown is Nova Scotia's self-reliance for each of these products, as calculated using 2007 production figures as a percentage of 2007 consumption. Finally, in cases where personal communication with growers or others in the food industry indicated that self-reliance figures may not give an accurate picture of what one would find in NS stores, an alternative estimate was given.

¹⁶⁷ The weighted average takes into account the proportion of product coming from each country, Canadian province and US state to calculate the average distance or emissions.

Table 45: NNFB - Weighted Distances and Transport Emissions

Food Item	Weighted Average Distance (Km)	Weighted Average Emissions (kg CO₂e per kg food traveled)	NS Self-Reliance (production divided by consumption - 2007)	% of NS Product in Stores (estimate)
MILK PRODUCTS				
2% MILK	350	0.071	100%	100%
YOGURT	1269	0.259	0.22%	
CHEDDAR CHEESE,	456	0.093	46%	
PROCESS CHEESE SLICES	1406	0.287	0%	0%
MOZZARELLA CHEESE	X	X	X	X
VANILLA ICE CREAM	638	0.130		80%
EGGS				
GRADE A LARGE	350	0.071	100%	100%
MEATS, POULTRY, FISH				
ROUND STEAK	4908	1.017	11.91%	
STEWING BEEF	4908	1.017	11.91%	
HAMBURGER, MEDIUM	4908	1.017	11.91%	
PORK CHOPS, LOIN	939	0.192	52.33%	
CHICKEN LEGS, FROZEN	1409	0.297	100%	50%
WIENERS, BEEF & PORK	X	X	X	X
SLICED HAM	939	0.192	52.33%	
FROZEN FISH FILLETS	X	X		
PINK SALMON, CANNED	6902	1.803	0%	0%
TUNA, LIGHT, FLAKED, CANNED, WATER	19760	4.387	0%	0%
MEAT ALTERNATIVES				
BAKED BEANS W/TOMATO SAUCE, CANNED	4224	0.934	0%	0%
DRY NAVY BEANS	3704	0.768	0%	0%
PEANUT BUTTER	6759	1.458	0%	0%
GRAIN PRODUCTS				
BREAD, ENRICHED, WHITE	4562	0.409	0.01%	
BREAD, WHOLE WHEAT	4562	0.409	0.01%	
HOT DOG/HAMBURG ROLLS	4562	0.409	0.01%	
FLOUR, WHITE, ALL PURPOSE	4562	0.409	0.01%	
FLOUR, WHOLE WHEAT	4562	0.409	0.01%	
MACARONI/SPAGHETTI	4605	0.412	0%	
RICE, LONG-GRAIN, WHITE	9953	2.164	0%	
MACARONI /CHEESE DINNER	4056	0.501	0%	
OATMEAL, REGULAR	4163	0.405	0.10%	

CORN FLAKES	3129	0.640	0%	
SHREDDIES	3062	0.383	0.14%	
SODA CRACKERS, SALTED	3062	0.383	0.14%	
SOCIAL TEAS	3062	0.383	0.14%	
CITRUS FRUIT & TOMATOES				
ORANGES	5178	1.083	0%	0.00%
APPLE JUICE, CANNED OR TETRA	1092	0.234	228.42%	75%
ORANGE JUICE, FROZEN, CONCENTRATE	7831	1.728	0%	0%
TOMATOES	3583	0.732	22.89%	
WHOLE TOMATOES, CANNED	3421	0.716	0%	0%
TOMATO JUICE, CANNED	1788	0.365	0%	0%
OTHER FRUIT				
APPLES	3542	0.761	432.54%	55%
BANANAS	5072	1.126	0%	0%
GRAPES	7806	1.668	0%	0%
PEARS	7545	1.634	20.72%	
RAISINS	6811	1.418	0%	0%
FRUIT COCKTAIL, CANNED, JUICE PACK	9830	2.182	0%	0%
POTATOES				
POTATOES, FRESH	567	0.116	1742.22%	82%
FROZEN FRENCH FRIED POTATOES	418	0.085	1742.22%	82.70%
OTHER VEGETABLES				
BROCCOLI	1633	0.333	51.86%	
CABBAGE	1479	0.302	42.85%	
CARROTS, FRESH	1154	0.236	389.28%	75.00%
CELERY	3479	0.710	0%	0%
CUCUMBER	2243	0.460	8.73%	
LETTUCE, ICEBERG	3454	0.705	0.32%	
LETTUCE, ROMAINE	3454	0.705	0.32%	
ONIONS	1226	0.250	158.88%	80%
GREEN PEPPER	3364	0.702	1.57%	
TURNIPS	344	0.070	93.99%	
MIXED VEGETABLES, FROZEN	X	X	X	X
KERNEL CORN, CANNED	7254	1.598	0%	0%
GREEN PEAS, CANNED	1023	0.209	0%	0%
FATS AND OILS				
MARGARINE, TUB (too difficult to calculate)	X	X	0%	0%
BUTTER	350	0.071	111.23%	Slightly less than

				100%
CANOLA OIL	4598	0.938	0%	0%
SALAD DRESSING (too difficult to calculate)	X	X	0%	0%
SUGAR AND OTHER SWEETS				
SUGAR, WHITE	11149	2.433	0%	0%
STRAWBERRY JAM (Strawberries only)	6162	1.328	0%	0%

Average Distance Traveled by NNFb food item: 3976 km

To gain a better understanding of the distance traveled and GHG emitted by each of the 11 food groupings, we gave each of the food items a weight as per the food costing methodology of the National Nutritious Food Basket (Nova Scotia Participatory Food Security Projects, 2007). This methodology applies different weights to each of the products in the basket, based on nutritional requirement. See appendices for the weights. For example, fluid milk is weighted more heavily than yogurt, cheese or ice cream, as it should make up a higher percentage of one’s dairy intake. As there was no distance or emissions data for certain products, those food groups were re-weighted to exclude those products. The proportions of the remaining products were kept constant.

Nutritional needs vary according to gender and age (e.g. an adult female requires more iron on a daily basis than an adult male). Lawn (1998) outlines factors for each age and gender group, which aid in the calculation of how much of a given food grouping one would eat in a week. We chose to calculate the distance and emissions for a basket of food eaten by a female aged 25-49 years. See appendices for the factors. The total distance for a weekly basket is the sum of the weighted average distance for each food grouping multiplied by the factor. The total emissions are calculated using the same method.

Table 46: Weighted Distance and Emissions by Food Group based on nutritional needs of a female, aged 25-49 years

NNFB Food Groupings	Weighted Average Distance (km)	Weighted Average GHG (kg of CO₂e per 1 kg of food)	Factor	Distance x Factor (km)	GHG x Factor (kg CO₂e)
Milk Products	487	0.099	3.5	1704	0.348
Eggs	350	0.071	3.00	1050	0.214
Meats, Poultry, Fish¹⁶⁸	3134	0.668	0.85	2664	0.568

¹⁶⁸ Reweighted to exclude hot dogs, frozen fish fillets

Meat Alternatives	5323	1.155	0.20	1065	0.231
Grain Products	4685	0.550	1.40	6558	0.769
Citrus Fruits & Tomatoes	3507	0.744	0.80	2805	0.595
Other Fruit	5460	1.192	1.50	8191	1.788
Potatoes	552	0.113	1.00	552	0.113
Other Vegetables¹⁶⁹	2451	0.511	1.65	4044	0.842
Fats and Oils	not calculable	not calculable	0.15		
Sugar & Other Sweets	10169	2.216	0.20	2034	0.443
Total Weekly Basket				30,666	5.911

The distances and GHG emissions for a theoretical “all-local NNFB basket” were also calculated. To maintain continuity, we estimated 350 km for travel within the province for all local foods.

Table 47: Theoretical All Local NNFB Basket

	Weighted Average Distance (km)	Weighted Average GHG (kg of CO₂e per 1 kg of food)	Factor	Distance x Factor (km)	GHG x Factor (kg CO₂e)
Milk Products	350	0.071	3.5	1225	0.250
Eggs	350	0.071	3.00	1050	0.214
Meats, Poultry, Fish	350	0.071	0.85	298	0.061
Meat Alternatives	350	0.071	0.20	70	0.014
Grain Products	350	0.071	1.40	490	0.100
Citrus Fruits & Tomatoes	350	0.071	0.80	280	0.057
Other Fruit	350	0.071	1.50	525	0.107
Potatoes	350	0.071	1.00	350	0.071
Other Vegetables	350	0.071	1.65	578	0.118
Fats and Oils	350	0.071	0.15	53	0.011

¹⁶⁹ Reweighted to exclude frozen vegetables

Sugar & Other Sweets	350	0.071	0.20	70	0.014
Total Weekly Basket				4988	1.017

Discussion: National Nutritious Food Basket

Milk Products

Due in part to the milk quota system, Nova Scotia has a high level of self-reliance in dairy. As seen in table 2 above, Nova Scotia produces nearly all fluid milk consumed in-province, almost half of the cheese, and nearly all of the ice cream. If we look at dairy in a Maritime context self-reliance, especially for cheese (80-90%), is even higher. Yogurt is a notable exception. With the exception of one artisan yogurt producer, there is no cow's milk yogurt being produced in the Maritimes. (There is also no processed cheese produced here, but given its low nutritional value, processed cheese manufacturing should not be encouraged.)

Grocery store visits revealed instances of redundant trade, not captured in the statistics. Even though Nova Scotia produces enough butter and ice cream to meet our needs, and nearly enough cheese, products from Ontario, Quebec and beyond occupy a lot of the shelf space.

While our fluid milk needs are met with local production, there are missed opportunities to meet the demands of the organic market. Organic fluid milk is produced in Ontario. Despite the formation of the Scotia Organic Milk Producers co-operative and an offer by a Nova Scotia dairy to process the milk, there is still no organic milk in Nova Scotia grocery stores.

Eggs

Due to the quota system, nearly 100% of the fresh eggs eaten in Nova Scotia are produced here. Discussions with producers reveal that some fast food chains may use eggs from other provinces; however, this accounts for a relatively small percentage of egg consumption. Researchers did not find any information on powdered or liquid egg product, and thus the prevalence of these products is unknown.

Meats, Poultry, Fish

This food grouping proved to be one of the most difficult food groups for which to determine the origins of the food items. This is partially due to a lack of data. For example, Statistics Canada collects and reports data on the number of animals raised in Nova Scotia, but not on slaughter data at the provincial level. An additional challenge when calculating GHG emissions associated with meat, fish or poultry was considering the number of times the animal and then the carcass moves throughout its lifecycle, from

birth, to slaughter, to packaging, to distribution centre, to grocery store. Additionally the transportation of animal feed could also be considered in the distance of a given meat production. However, given limitations of data availability, this study has focused on the distance from slaughter to store.

The NNFB lists specific cuts of meat. We, however, were not able to obtain data for that level of detail, so instead we examined beef, pork, chicken and fish products at a more general level.

In Atlantic Canada, we produce approximately 12% of the beef we consume. As most (68%) of the beef consumed in Nova Scotia, is produced in Alberta, it was assumed that any Canadian beef produced outside of the Atlantic Canada was from Alberta. The remaining beef came from Kansas, Colorado, New Zealand and Uruguay. For more details on beef, see the beef case study.

In 2007, Nova Scotia farmers produced just over half of the pork we consumed. The remainder was produced in Quebec (27%), Virginia (13%) and Illinois (7%). However, the pork industry has been in a state of crisis in recent years and the situation has changed dramatically since 2007. In 2008, we produced only about 23% of the pork consumed and by 2009 it had dropped to about 8%.

Chicken is produced in a supply-managed system. Nova Scotia production is approximately equal to Nova Scotia consumption. However, not all of the chicken produced here is processed here. Since the closure of the Maple Leaf plant in Canard, NS, in April 2007, 46% of the chicken produced in NS has been shipped to Nadeau Poultry in St. Francois de Madawaska, NB. The remainder is processed by ACA Co-operative in New Minas, NS. Additionally, 7.5% of the amount of the previous year's domestic production of chicken may be imported into Canada. In 2007, imports came from Brazil and the United States, namely, Georgia and South Carolina. For this study, we have assumed that 7.5% of our chicken was imported, with 46% of the remainder (42.55%) making a round trip to NB, and the rest coming from NS.

The NNFB includes hotdogs as a food item; however, researchers were unable to obtain information on the origins of ingredients used in this processed meat. One can obtain the processing location by consulting the package. Most processed meat packaging displays a circle with a crown and a number. The number refers to a federally registered meat processing facility. To look up codes on packaged meat, visit this website: <http://active.inspection.gc.ca/scripts/meavia/reglist/reglist.asp?lang=e>

Three different fish products are used in the National Nutritious Food Basket: canned tuna, canned salmon, and frozen fish fillets. Canned tuna is processed mainly in Thailand (over 96%), with small amounts processed in the Philippines and Vietnam. Tuna may be caught long distances from the processor, and the distance from where the tuna was caught to the processor is unknown. The salmon used in canning is fished mainly on the west coast. Based on the grocery store survey, it was assumed that 50% of the salmon was coming from British Columbia. The other half was found to be coming mainly from

Washington State. Frozen fish fillets proved to be a problematic item for which to calculate food miles. Frozen fish fillets in the grocery store can be haddock, cod, pollock, or other varieties of fish. While large quantities of fish are caught off of the shores of Nova Scotia, the vast majority of this fish is exported and is processed in different locations worldwide. Processing requiring a lot of labour, e.g. skewering or filleting, is likely done in China; whereas more mechanized processing, e.g. deep-frying, breading, glazing, could be done in Nova Scotia (S. Arnold, pers. comm. June 18, 2009).

Meat Alternatives

None of the three meat alternatives used in the NNFB are produced in the Maritimes. Navy beans are primarily grown in Ontario, Manitoba, and the mid western United States, namely Michigan, Idaho and North Dakota. The top three locations from which peanuts were imported in 2007 are from Georgia (USA), China, and Texas. Given the number of different brands of peanut butter, it was difficult to determine where the peanut butter was being processed. There is peanut butter processing facility in Sussex, NB and an organic peanut butter processor in Kentville, NS. For other brands we were unable to determine the processing location.

Although none of the above meat alternatives are produced in the Maritimes, there are some local options for meat alternatives. For example, yellow eye, Jacob's cattle, and soldier beans are grown in the Maritimes, as is some soy. Acadiana Soy Products and Hardy's Organic Products (makers of Maritime Soycraft products) process soy in the Maritimes.

Grain Products

Little grain for human consumption is grown in the Maritimes, due to unfavourable climate conditions. The origins of spring, winter and durum wheat, as well as oat products were estimated based on Canadian production data. It was assumed that flour and bread products were made from spring wheat, grown in Saskatchewan, Alberta and Manitoba. Oats are also a key crop in the prairies. Durum wheat, used in pasta, is primarily produced in Saskatchewan, with a smaller amount grown in Alberta. While these products travel a great distance, it was assumed that they travel by rail as far as Toronto, then by truck from Toronto to Halifax. Rail is the most energy efficient mode of freight transportation. Winter wheat, used in pastries, is grown primarily in Ontario, with smaller amounts grown in Manitoba, Saskatchewan and Alberta.

Rice is imported from a variety of areas. In 2007, just over 60% of our rice came from the United States, namely Arkansas, California, and Mississippi, and the remainder came primarily from Thailand and India.

The origin of cornflakes was somewhat difficult to determine, and some assumptions had to be made. The grocery store survey revealed that Kellogg's brand cornflakes were processed in London, Ontario. Determining the origin of the corn was more difficult. Although corn production in Canada is reported, it is not possible to determine which is

grown for human consumption and which for animal consumption. Canada also imports corn, predominately from Illinois and Indiana (the “corn belt”). For the purposes of calculating food miles, it was assumed that all corn was coming from these regions.

Citrus Fruit, Tomatoes & Juice

Nova Scotia is home to an apple juice plant, which only uses apples from NS and NB to produce juice. Production figures were based on information provided by Great Valley Juices. In 2007 (fall 2007 to spring 2008) they produced approximately 15 million litres of juice. This represents 228% of Nova Scotia’s consumption needs and 117% of Maritime consumption. The Great Valley Juice plant only produces juice in cans and glass, thus apple juice packaged in tetrapaks or plastic are produced at other facilities located outside of the Maritimes. As juice in plastic or tetrapak containers is available in local grocery stores, it appears that a certain amount of redundant trade is taking place.

Nova Scotia appears to produce just over 20% of the fresh tomatoes we consume. This is largely due to greenhouse tomato production. We do not have any tomato processing facilities in Nova Scotia. Nor do we produce any citrus fruit.

In 2007, the top locations from which we imported orange and tomato products were as follows:

- Oranges: California, Florida and Morocco.
- Orange Juice: 85% from Brazil, smaller amounts from Florida & California
- Fresh Tomatoes: Mexico, Florida, California, Ontario
- Canned Tomatoes: 40% Ontario, followed by California & Italy
- Tomato Juice: assumed Ontario (data unreliable)

Other Fruit

Of the fruit included in the basket, we only produce apples and pears; the others are produced in much warmer climates. In 2007, the top locations from which we imported warm climate fruit were as follows:

- Bananas: Costa Rica, Columbia and Honduras
- Grapes: California, Chile, Mexico
- Raisins: California, Iran

Nova Scotia production of apples is over four times our consumption of fresh apples. However, many of the apples produced here go to processing. When consumption of both fresh and processed apple products is taken into account, production is just under twice our consumption levels. Despite high production levels of apples, we still import large quantities of apples from other locations, even during the apple harvest season. While there are no exact figures, in conversations with those in the apple industry some have suggested that anywhere from 40-60% of the fresh apples consumed in Nova Scotia were grown outside of the Maritimes. The top locations from which we import apples outside of Canada are Washington State, Chile and New Zealand.

According to Statistics Canada production and consumption statistics, Nova Scotia produces about 20% of the pears we eat. Local pears and other tree fruit, such as peaches, cherries, and plums, are primarily marketed through farm markets, farmers' markets, or other direct marketing venues and thus those involved in the industry were unable to say whether the statistics matched the actuality of the tree fruit situation in Nova Scotia. Imported pears are primarily from Washington State, China and Argentina.

Potatoes

If we look at fresh potato consumption as a percentage of our potato production in Nova Scotia, we find that Nova Scotia produced about 97% of our fresh consumption in 2007. This percentage has fluctuated between 82% and 160% over the past 14 years. A certain (unknown) percentage of Nova Scotia potatoes are processed at the Frito-Lay plant located in Kentville, Nova Scotia.

Additionally, New Brunswick, PEI and Maine produce large amounts of potatoes, so there is no lack of locally grown fresh potatoes or processed potato products. In fact when both fresh and processed potato consumption is taken into account, the Maritime provinces produced 1718% of our consumption in 2007.

Other Vegetables

Nova Scotia can produce all of the vegetables in the National Nutritious Food Basket, though some are better suited to the climate than others. Nova Scotia produces little lettuce, green pepper, and no celery; nor do we have processing facilities to can corn or peas. While our production levels of carrots, turnips and onion in the Maritimes are greater than our consumption levels, we do import these vegetables from other regions. Importation occurs mainly in the off-season, though some varieties of onions are brought in year round. Until recently, there were no locally produced baby-cut carrots, and this product was being imported as well. A local grower is now producing baby-cut carrots and is able to fill some of the local demand.

The top locations supplying vegetables to Nova Scotia are as follows:

- Broccoli: Nova Scotia (48%), Maine (25% - perhaps an anomaly for 2007), California (14%), (in past years California was about 35%, followed by Arizona & Florida)
- Cabbage: Maritimes (67%), California (14%), New Jersey (7%)
- Carrots: Maritimes (75%), Georgia (14%), and California (8%)
- Celery: Florida (54%), California (23%), Quebec (13%), Ontario (9%)
- Cucumber: Ontario (55%), Florida (16%), NS (9%), Quebec (6%)
- Lettuce: New Jersey (35%), California (24%), Arizona (16%), Florida (15%), Quebec (8%)
- Onions: Nova Scotia (80%), Idaho, Georgia, California
- Green pepper: Florida (54%), Georgia (9%), Ontario (7%), North Carolina (5%), New Jersey (4%), Quebec (3%)

- Turnip: All Maritime
- Mixed Frozen Vegetables: China, Belgium, US, Mexico
- Canned corn: Thailand & Quebec
- Canned peas: Assumed Quebec

Data on frozen vegetables are problematic. While import and export figures are available, information on the supply within the country and in which province it was being produced was unreliable or unavailable. Import data showed imports coming from China (30% of imports), Belgium (26%), Mexico (18%), and Oregon (15%), with small amounts coming from other countries and US states. It is not known how much of our supply is comprised of imports.

The grocery store survey showed canned corn from Canada and Thailand and canned peas from Canada. Based on a conversation with a former canning facility employee, it was assumed that all of the canned corn and pea products were coming from Quebec, as they are produced by Carriere/Bonduelle.

Fats and Oils

Fats and oils proved to be a difficult category. Given the variety and number of ingredients in margarine and mayonnaise, researchers could not estimate distance traveled nor make an educated guess as to the origin of the ingredients. Canola oil origins were estimated based on production data, and thus mainly from Saskatchewan, Alberta, and Manitoba. Butter was the only product in this category that is produced within the province.

The most recent year for which butter production data for the Maritimes is available is 2004. Using 2004 production numbers and 2007 consumption data, it was found that we produce 111% of our consumption. If 2004 consumption figures are used, it is 94%. It appears, then that we can meet approximately all of our butter needs within the province. Again, visits to the grocery store turn up suggestions of redundant trade. The store shelves hold butter from Ontario, Quebec, and other Maritime provinces.

Sugar and Other Sweets

In 2007, the top locations from which raw sugar was imported were Brazil (over 70%), Guatemala and Nicaragua. The two major brands of sugar found in Nova Scotian grocery stores are Lantic and Redpath. According to their websites, Lantic is refined in Montreal and has a distribution centre in Toronto; Redpath is refined in Toronto.

Strawberry jam is the other product included in this section. To estimate the distance that strawberry jam was traveling, researchers calculated the distance traveled by fresh, frozen or prepared strawberries coming into Canada. California, Florida and Mexico were the top locations from which strawberries were imported in 2007. It was assumed that the strawberries were processed in Toronto before traveling to Nova Scotia. Unfortunately, without knowing the percentage of the weight to allocate to strawberries versus other

ingredients like sugar, it was not possible to calculate the full food miles and GHG associated with the transport of strawberry jam, and thus this calculation is for processed strawberries only.

There are local options for sweeteners and jams. While not included in the NNFB calculations, both honey and maple syrup are produced locally. Some jams are produced locally with seasonally available berries as well, though at a cottage industry level.

Conclusion

The average distance traveled by a food item in the NNFB is 3,976 km. When you consider a weekly basket of goods, the total distance traveled is 30,666 km and 5.911 kg CO₂e. A theoretical, all-local basket is approximately a sixth of the distance and emissions: 4988 km and 1.017 kg CO₂e.

The food groupings listed from greatest transport related GHG emissions to least transport related GHG emissions on a weekly basis are as follows:

- Other Fruit
- Other Vegetables
- Grain Products
- Citrus Fruit, Tomatoes and Juice
- Meat, Poultry and Fish
- Sugar and Other Sweets
- Milk products
- Meat Alternatives
- Eggs
- Potatoes

This suggests that there is potential for reducing emissions by switching to more fruits and vegetables that are produced here in the region, provided that the fruit and vegetable crops are produced by methods that are of similar or increased energy efficiency. Though not included in the NNFB, we produce large quantities of blueberries, as well as variety of tree fruits and berries. We also produce a wide variety of horticultural crops. With low-energy season extension techniques, cold storage, processing and preserving – at both the industrial level and the household level – there is a lot of potential to increase local fruit and vegetable consumption throughout the year.

For foods that we cannot produce easily produce here, we should promote more energy-efficient modes of transportation, i.e. rail, or consider local alternatives, if they exist, e.g. honey and maple syrup in place of sugar.

Local Sustainable Food Procurement Policies

Introduction

Government departments and institutions procure a wide range of goods and services in the course of their operations. Because of their size and relative stability, institutional procurement policies can help support local agriculture system by providing a market for producers.

In a literature review of local food procurement policies (MacLeod and Scott, 2007), researchers saw innovative examples of local and sustainable food procurement policies and their implementation from Italy, the United Kingdom, the United States and Canada.

In Italy, the policy to increase the use of local foods in schools is part of a larger food education initiative that seeks to promote traditional cultural foods and to actively involve parents in the ongoing evaluation of their children's diets. A UK school found their local food initiative doubled the number of meals sold in the school cafeteria, making the cafeteria more profitable and allowing further investments in quality food, increased wages for staff, and new kitchen equipment. A healthcare provider in the United States, in addition to increasing local food procurement in their cafeterias and in-patient food service, opened farmers' markets at 32 of their hospitals, and saw increased fruit and vegetable consumption by their staff, patients and the surrounding community. And a university cafeteria created a local, seasonal menu that was so tasty, students were creating fake IDs just to eat there.

As these examples suggest, governments and institutions in many regions are developing local, sustainable food procurement policies and are working through the challenges of implementation. As a follow-up to our examination of procurement policies in other regions, this chapter is a summary of federal, provincial and municipal policies in Nova Scotia that impact local, sustainable food procurement.

Federal Government

Prisons

There are currently two federal correctional facilities in Nova Scotia: Springhill Institution and the Nova Institution for Women (Correctional Service Canada, 2009a). There are between 500 to 570 inmates in total (P. Mavridis, pers. comm. April 28, 2009). Currently there are no local, sustainable food procurement policies for food service in federal correctional facilities and purchasing decisions are based on the most economical price. The budget for meals is \$4.57 per person per day, which includes three meals and one snack (P. Mavridis, pers. comm. April 28, 2009).

According to the Standard Operating Practices (Correctional Service Canada, 2009b) "In those regions where CORCAN operates an Agribusiness Program, Food Services should

purchase and use food products produced by the institutional farms.” However, there are no prison farms in Nova Scotia. Additionally, Correctional Service Canada plans to close all six prison farms in the country. The reason cited is that “prison farms no longer provide employable skills training to inmates because the number of farms in Canada has declined” (National Farmers Union, 2009).

The National Farmers Union cites this as a short-cited move:

Not only do the inmates gain technical and social skills from this program, the prison farms also contribute a considerable quantity of locally-grown food to the institution and the surrounding community. The loss of this locally-sourced food will increase the financial burden on taxpayers.

(National Farmers Union, 2009)

Other federal government departments

While it appears that no overarching federal sustainable food procurement policies exist, individual government departments have developed policies or guidelines to be used for internal functions and meetings. For example, the Atlantic Branch of Health Canada has a Healthy Meeting Policy which suggested the local food choices be included whenever possible (Health Canada, Atlantic Branch: 2009). Environment Canada has a Green Meeting guide that states, “Use local suppliers when possible, particularly for produce, other food products and beverages. This reduces transportation requirements and the associated environmental impacts” (Environment Canada, 2007: 17).

Provincial Government

Environmental Goals and Sustainable Prosperity Act

In April 2007, the government of Nova Scotia passed the Environmental Goals and Sustainable Prosperity Act. Section 4 (2) (q) states that “a sustainable procurement policy for the Province will be developed and adopted by the year 2009”. Food procurement is one purchasing area that will be included in this policy. The policy will require departments to consider social, economic, and environmental issues when purchasing. The Sustainable Procurement Policy was adopted in August 2009. Specific purchasing guidelines will be developed for each category of purchases and appended to the policy when complete (Nova Scotia Procurement Services, 2009). Guidelines regarding food purchasing have not yet been developed.

Hospitals and Other Healthcare facilities

Most of the hospitals and many nursing homes in Nova Scotia belong to Nova Scotia Health Care Purchasing Limited (NSHCPL) (C. MacLean, pers. comm., June 16, 2009). NSHCPL was formed in 1997 to maximize the buying power of health care facilities in the province by developing contracts with various food suppliers. A food and nutrition committee of representatives from facilities across the province guides the purchasing decisions. Contracts with suppliers are negotiated on a yearly basis and individual health

care facilities can decide if they want to be part of a given contract. For example, a facility could commit to participating in the dairy contract, but decide not to participate in the produce contract.

NSHCPL tenders as many food items as possible. However, some food items are purchased in very small quantities and thus are not tendered. NSHCPL tenders to food manufacturers, e.g. Kraft, Heinz, McCain. All things being equal and price competitive, the bid will be awarded to the local company (C. MacLean, pers. comm., June 16, 2009). Local is defined as within Atlantic Canada. NSHCPL does not track how much of the food they purchase is local; however, it would be possible to go through past records to calculate how much was purchased locally (C. MacLean, pers. comm., June 16, 2009).

Sysco is the distributor for most of the products. The distribution contract is tendered every 5 years. There are some exceptions, such as milk and bread, in which the company is both the supplier and distributor (e.g. Farmers Dairy and Ben's Bread).

NSHCPL requires all suppliers to be Hazard Analysis and Critical Control Point (HACCP) certified. This decision came out of a food safety concerns in the early 1990s and a desire to take a pro-active approach (C. MacLean, pers. comm., June 16, 2009). As NSHCPL has only two staff members, they do not have the capacity to inspect facilities themselves and thus decided to use HACCP certification, an international quality assurance process, as minimum standard.

Facilities are encouraged to buy through NSHCPL (Ginny Point, pers. comm. May 1, 2009). There is an incentive program offered by some suppliers, in which a rebate is offered to NSHCPL that is then redistributed back to the health care facilities. The more that is sold, the larger the rebate.

When asked if there are products he would like to buy locally, but cannot, Charlie MacLean notes that the recent closure of the Valley House chicken processing facility now means that value-added chicken is sourced from outside of the province or sometimes outside of the country. Some cuts of beef are also unavailable locally, though the majority of the beef cuts (roast, ground and diced) are available.

For those purchasing food for health care facilities, one of the barriers to buying local, both through NSHCPL and separately through other suppliers, is the lack of labeling and information about the origins of products (Ginny Point, pers. comm. May 1, 2009). It would be beneficial for the product availability list from the suppliers to contain information on what is local or not, and where it is from. Ginny Point (pers. comm. May 1, 2009) notes that there are many individuals within health care food service who are committed to supporting local food and would welcome better information to make it easier to purchase from those who are supporting local producers.

In the hospitals in the Capital Health District, the district comprising the Halifax Regional Municipality and the western part of Hants County, restaurant and retail food service is run separately from in-patient food services. The restaurant and retail food service is run

by Morrison, a division of the Compass Group. Capital Health is currently in the process of reexamining the food served in their facilities (Capital Health, 2009a). In the spring of 2009, they convened a panel of key stakeholders and citizens to address the following questions:

- How must Capital Health change its restaurant and retail food choices to reflect a fiscally responsible, sustainable and health-promoting organization?
- What service changes do we need to make to align food/retail service with healthy food choice policy? (Capital Health, 2009a: 1)

The April 2009 document outlines five issues facing restaurant and retail food service. They are as follows:

- Capital Health must change the food it serves to staff and visitors to reflect its health promotion role.
- Capital Health must provide some level of food service in its hospitals and health centers.
- Capital Health receives revenues from retail and vending food and beverage services.
- Capital Health's restaurant, retail and vending food services must not lose money.
- Healthy food choices should be consistent at all Capital Health sites, reflecting local preferences and respect a variety of ethnic and cultural needs. (Capital Health, 2009a: 2-3).

The April 2009 document also notes the amount of revenue generated on an annual basis by retail and vending services, of which the food options are rarely healthy or local. About \$369,000 is generated from snack foods in retail stores, \$77,000 from beverage and vending contracts, \$2.1 million from Tim Horton's and \$518,000 from fried food (Capital Health, 2009a).

As a result of this process, the Healthy Food Citizen-Stakeholder Reference Group made a number of recommendations. Recommendations included:

- phasing out unhealthy food items over a two year period beginning with deep fried foods;
- looking to the Nova Scotia School and Nutrition Policy for guidance
- bringing Capital Health's health care professionals on board as champions of this new policy;
- using local food suppliers as much as possible (Capital Health, 2009c).

The Capital Health Leadership Enabling Team agreed in principle with the decisions made by the reference group and are currently working on implementation. The Leadership Enabling Team notes that various financial and contractual obligations must also be taken into consideration and that full implementation may not occur within the two year timeline proposed by the Reference Group (Capital Health, 2009c).

Capital Health also recently established a farmers' market at the Victoria General hospital site. The market was held every Friday from June 12 to October 9, 2009 (Capital Health, 2009b).

Schools

In September 2004, the Nova Scotia Department of Education led a consultative process regarding school food and nutrition, which included the Department of Health Promotion and Protection, the Department of Agriculture, teachers, school boards, administrators and other key stakeholders. The results of this process lead to the development of the *Food and Nutrition Policy for Nova Scotia Public Schools*, which came into effect in 2006. The policy contains both directives (mandatory) and guidelines (recommended) pertaining to healthy eating. Included in the guidelines is a reference to purchasing local food:

14. Nova Scotia Produce and Products

Nova Scotia produces an abundance of produce and products. Buying food that is grown and produced within the province supports Nova Scotia agriculture and business and means that more money remains in the community. Locally grown, fresh food is often more nutritious if it is used shortly after harvest. (Nova Scotia Department of Education and Nova Scotia Department of Health Promotion and Protection, 2006: 8)

14.1 Whenever possible, schools and food service providers should use food and beverages that are grown, produced, or manufactured in Nova Scotia and Atlantic Canada. (Nova Scotia Department of Education and Nova Scotia Department of Health Promotion and Protection, 2006: 10)

To support the School Food and Nutrition Policy, including the guideline on local food, the Strive for Five program was developed (L. Corbin, personal communication, April 17, 2009). Strive for Five was started as a project of the Producer-Supplier Committee of the Annapolis Valley Health Promoting Schools Program and was funded by the Nova Scotia Department of Health Promotion and Protection. It is expanding to be used across the province. Strive for Five promotes consumption of local fruits and vegetables through a collection of recipes that are appropriate for institutional cooking and that use local, in-season produce. Training sessions have taken place in many of the school boards and the resource itself is in the final stages of production.

Individual schools and boards are also taking on initiatives to promoting local produced nutritious foods. For example, Capital District Public Health and the Halifax Regional School Board have sponsored the Fall Fruit Frenzy in the 2007 and 2008 (A. MacDonald, pers. comm. April 16, 2009). The Fall Fruit Frenzy provided free local produce to students, along with educational materials about local food and healthy eating. In 2007, a pilot was conducted with 11 elementary schools in the Halifax Regional Municipality. In 2008, 23 junior high schools with 6000 students total, participated in the program.

The Department of Health Promotion and Protection conducted a survey of Nova Scotian schools in June 2008 to monitor the implementation of the School Food and Nutrition Policy. Feedback regarding the policy has been mostly positive (L. Corbin, pers. comm.

April 17, 2009). Many schools and boards were already creating their own food and nutrition policies and School Food and Nutrition Policy brought a lot of existing pieces together. The policy was created using a participatory process, including many consultations with staff, parents and students.

The survey asked what resources schools require to better implement the policy. The top responses were as follows:

- Staffing and volunteer support within the school
 - Nutritionist and health promotion expertise and guidance
 - Educational and promotional material
 - Subsidies to offset food costs
 - Additional equipment and space
 - Staff training (e.g. food safety training) and development
- (L. Corbin, pers. comm., April 17, 2009)

Additionally, there are challenges for the food suppliers themselves. O.H. Armstrong is one of the suppliers of food to schools. They are striving to supply locally produced products but note challenges in obtaining local products (M. Roach, pers.comm. April 17, 2009). Sometimes local options do not exist. For example, the loss of many of the province's pork producers has severely limited the local pork supply. Similarly, the recent closure of the Eden Valley chicken plant has limited the local chicken products available. They also face challenges in purchasing supply of consistent quality. Roach also notes that they prefer to buy from co-ops or larger producers as they are selling larger volumes of product. Price can also be an issue. If the local price is higher and they know that their school and hospital customers are on tight budgets, they often have to go with the lowest price, even if they want to support local.

On the positive side, Roach (pers. comm. April 17, 2009) has found that some school boards, especially in the Annapolis Valley, are very aware of the importance of locally produced food. They have also been working with farmers to pilot different vegetables in the schools. For example, a farmer donated several cases of brussels sprouts, O.H. Armstrong delivered them to schools for a small fee and schools tried out the products.

Beyond the supply challenges, some barriers are of a financial nature. Roach (pers. comm. April 17, 2009) notes that cafeterias aren't making as much money on healthy food, as they did with unhealthy food. This has prompted a couple of instances where the food service provider to cease operations in some smaller schools. This means that the school cafeteria then has to be run by the school itself. Additionally, with the removal of vending machines schools are no longer able to have pouring contracts and thus have lost a fundraising source. In the larger schools that could mean receiving up to \$30,000 annually from beverage suppliers. Additionally, as with the hospitals, national chains, such as Aramark or Tim Hortons, have contracts with Sysco and receive rebates for selling large volumes.

Some challenges may become easier is time as habits are changed. Roach (Pers. comm. April 17, 2009) has noticed that the school food nutrition policy is working well in

elementary schools. The younger children are more receptive to the switch to nutritious foods. The high schools are more difficult. Students have the option of leaving school grounds for lunch and going to fast food outlets. It is also a larger change for them, as they were used to having the option of unhealthy foods.

Universities and Community Colleges

Nova Scotia is home to 11 universities and 13 community college campuses. There are approximately 42,000 university students (34,000 full time and 8,000 part time) and 25,000 community college students (MPHEC, 2008 & NSCC, 2009). Some universities have begun to examine food procurement on campus. Two such examples are Dalhousie University, in Halifax, and Acadia University, in Wolfville.

Dalhousie University's Office of Sustainability is working to reduce the university's environmental impacts and to increase sustainability. According to the website, "Dalhousie University is currently looking at producing an overarching sustainable food plan." (Dalhousie University, 2008). Though there is no plan yet in place, steps are being taken to examine the food choices on campus.

Food service on most of the campus is provided by Aramark, with the exception of food service in the Student Union Building, which is provided by Sodexo, and the University Club and Grad House, which are managed in-house (Dalhousie University, 2008).

From January to April 2008, Aramark purchased 32% of their food products from Maritime businesses and 49% from July to September 2008 (Aramark, n.d.). (Percentages are based on food expenditure.) The names of the suppliers are available online. The percentages include both Maritime grown products and products that were processed in the Maritimes with ingredients that may or may not have been produced here. For example, Ben's bread is included in the total. While it is baked here, the wheat is grown in the Prairies. Fair trade and organic coffee is also available.

Educational initiatives by Aramark include seasonal menus with local produce, promoting local menu items on the LCD screens in the dining halls, and bringing local farmers to the dining halls (Aramark, n.d.)

Acadia University is currently conducting a sustainability assessment using the framework from the Association for the Advancement of Sustainability in Higher Education (AASHE) (A. Redfield, pers. comm., June 12, 2009). As part of this assessment, the percentage of food expenditures which are local, organic or fair trade are being calculated. One of the difficulties encountered in the assessment process was the difficulty in distinguishing between local food and locally procured food (A. Redfield, pers. comm., June 12, 2009). In other words, food may have been purchased from local suppliers, but that food may or may not have been produced in Nova Scotia or the Maritimes and reliable data on the amounts of locally produced food was often not available.

Chartwells is the food service provider at Acadia University. They do not have any specific policies to increase local, organic or fair trade food procurement on campus, though they do purchase food from local suppliers (A. Redfield, pers. comm., June 12, 2009).

Chartwells does purchase produce from the Acadia Farm, a student-run organic farm on campus. In 2008/09, they purchased \$1,200 (1400 lbs) of produce from the farm. Items purchased included beets, tomatoes, peas, cucumber, beans, basil and other herbs. The farm is doubling their production this season (A. Redfield, pers. comm., June 12, 2009).

Municipal Governments

The role of municipal governments in Nova Scotia with regard to sustainable food policies has been rather small. However, in recent years, municipalities have begun to consider their role in sustainable food procurement. In August 2008, HRM put out a *Request for Expressions of Interest For Sustainable Catering Services Qualification List*. Sustainability criteria were included in the request. Such criteria included: organic ingredients, fair trade coffee, minimal packaging, reusable dishes, waste diversion, minimization/reduction of plastic beverage containers, eco-logo or FSC-certified napkins, no bottled water, and a delivery vehicle anti-idling policy. HRM procures food for staff/councillor meetings, staff training events, (e.g. lunch provided), boardroom meetings, etc. These guidelines are to be commended, as they are very comprehensive. They do not, however, specifically include local food.

The town of Bridgewater is currently developing an Integrated Community Sustainability Plan (ISCP). One of the five priority areas will be sustainable food. The development of their goals and strategies is currently in progress (Town of Bridgewater, 2009). A draft document, released July 8, 2009 for comment, sets two goals relating to food: 1) “All people in our community can afford and have access to healthy local food” and 2) “Food sources and distribution systems are secure and can adapt to disruptions” (Sustainable Bridgewater, 2009: 6). The proposed strategies to address these goals include:

- Connecting local producers and consumers
- Local people taking part in self-sufficient food practices
- Supporting social programs that make healthy food affordable
- Increasing the amount and diversity of food grown regionally and in our community
- Ensuring that local farming and food production is economically viable and socially supported
- Ensuring that food production is environmentally sustainable
- Ensuring sufficient shared & personal food storage in the community

(Sustainable Bridgewater, 2009: 6)

Conclusion

There has been a lot of interest recently in local, sustainable procurement. Policy makers are starting to bring more health and environmental concerns into their procurement decisions. Table 48 summarizes the state of food procurement policies affecting Nova Scotians.

Table 48: Summary Table - Local Food Procurement Policies

Federal Prisons	No local or sustainable food policy. A policy to buy from prison farms does exist; however, Nova Scotia does not have any prison farms and existing prison farms are being closed across Canada.
Other Federal Government Departments	Meeting guidelines for both Environment Canada and the Atlantic Branch of Health Canada suggest using local food where possible
Provincial Policies	The sustainable procurement policy for the province of Nova Scotia was adopted in August 2009
Health care facilities	No official policies regarding the purchase of local food. Many health care facilities purchase food via contracts negotiated by NS Health Care Purchasing Limited. Capital District Health is in the process of revising their food and beverage policy and has recently established a farmers' market.
Schools	The School Food and Nutrition Policy recommends buying local products when possible. The Strive for Five program promotes consumption of local fruits and vegetables through institutionally-scaled recipes and training for kitchen staff.
Universities	Dalhousie University has plans to develop a sustainable food plan. Acadia University is currently conducting a sustainability assessment, which includes food purchased by the university. They currently purchase produce from the Acadia Farm, an on-campus community garden.
Municipalities	Halifax Regional Municipality considers a range of sustainability criteria in its catering service qualification list. The Town of Bridgewater is including food in the town's Integrated Community Sustainability Plan.

Local vs. Imported Vegetables and Fruit

With the industrialization and globalization of our food system, our food habits have changed. We are now eating more processed, convenience, and junk food – loaded with sugar and preservatives. We are eating fewer vegetables and fruit than we used to, and *need* to for optimum health. According to the latest Statistics Canada figures, “less than one-third (29%) of Nova Scotians over age 12 eat the recommended 5-10 servings of fruit and vegetables every day. This compares to 35% nationally” (Healthy Eating Action Group 2005:21).

For those who still do eat fruit and vegetables, special treats like corn on the cob, fresh tomatoes, strawberries, or spring asparagus are now available all year. We don’t eat according to our garden and farm seasons anymore. Our diet is not a reflection of where we live at all.

Nova Scotians can instead work towards repopulated and vibrant farms, thriving rural communities, and a food system that works equally well for farmers and eaters.

Health and Economic Benefits

In order to relocalize our food system, our diets will need to shift. We’ll need to relearn how to enjoy our own farm products, how to structure our meals according to seasonal availability, and how to store and preserve our own bounty. This shift will produce health benefits as we reduce the amount of money we spend on junk food and increase the proportion we spend on real food from our farms.

Relocalization will not only revitalize our bodies, it will revitalize our rural communities. As people seek out and buy more locally-grown food, this has an impact on Nova Scotia farms. Our 2008 estimate of the proportion of our food dollar that goes to farmers is 13%.¹⁷⁰ That is shockingly low. What is more upsetting is that on average in 2008, Nova Scotia farmers didn’t have ANY net income. None. In fact, as a whole, they had negative \$1.5 million in net income. The small proportion of our food dollar that went back to Nova Scotia farms went to pay expenses. In other words, 0% of the food dollars we are spending in this province are going back into farmers’ pockets and staying there. We need to remedy this situation immediately or we are not going to have any local agriculture.

There are two things we can each do to help put our food dollars into farmers’ pockets as net income. First, we need to keep demanding locally produced food. In our homes, in our stores, in our offices and schools, and at events. Increasing demand will help put farmers in a better negotiating position when they are selling their crops. Second, and

¹⁷⁰ For more detail, see chapter on Economic Benefits and the Food Dollar.

more importantly, we need to ensure that farmers are being paid adequately for what they do. This can happen by buying more directly from farmers, and paying a fair price that will encourage the farm population to continue to farm. If farmers are making a living, everyone else in agricultural communities benefits because farmers spend a lot in their communities, and they employ so many people – directly and indirectly. Farms are wealth-generators.

Eating our own vegetables

A surprisingly small proportion of the vegetables we eat in Nova Scotia are actually grown here. Table 49 shows our vegetable production relative to consumption. This gives us a rough idea of our ability to supply the vegetables we eat. We produce roughly enough (or more) cabbage, carrots, onions, potatoes, and turnips to supply our own needs. There is a logic to producing these crops here, where cropping shuts down for several months every year, because they can be stored for winter use. We could, however, be producing – and eating -- a higher proportion of the other vegetables we produce here. Also, with season-extending unheated greenhouses, we could be producing more of the tender crops we eat so much of, like tomatoes, spinach, or lettuce.

Table 49: Vegetable Self-reliance, Distance Traveled, and GHG Emissions¹⁷¹

Crop	Production divided by Fresh Consumption - 2008	Production divided by Fresh & Processed Consumption - 2008	Weighted Average Distance (km) - 2007	Weighted Average GHG (kg CO₂e per 1 kg of food traveled) - 2007
Asparagus	1 %	1 %		
Beans	22 %	10 %		
Beets	45 %	51 %		
Cabbage	184 %	-	1,479	0.302
Carrots	652 %	476 %	1,154	0.236
Cauliflower	35 % ¹⁷²	32 % ²		
Celery	0 %	-	3,479	0.710
Corn (sweet)	35 %	13 %		
Cucumbers (field only)	4 %	-	2,243	0.460
Lettuce	1 %	-	3,454	0.705
Onion (Dry)	95 %	-	1,226	0.250
Parsnips	14 % ¹⁷³	-		
Peas	22 %	3 %		
Peppers	1 % ¹⁷⁴	-	3,364	0.702
Potatoes	97 %	42 %	567	0.116

¹⁷¹ Please see the chapter on Distance Traveled and Emissions of a Food Basket, for data sources and methodology. Derived from CANSIM tables 001-0013 and 001-0014 and the Canada Food Stats Database 23F0001XBB.

¹⁷² 2003 data, as this is the most recent data available

¹⁷³ 2004 data, as this is the most recent data available

¹⁷⁴ 2007 data, as this is the most recent data available

Radishes	0 %	-		
Rutabagas & Turnips	127 %	-	344	0.070
Spinach	8 % ⁴	5 % ⁴		
Tomatoes (field only)	2 %	-	4,543	0.928
Total Tomato (incl Greenhouse)	24 % ⁴	6 % ⁴	3,583	0.732

Another way we, as citizens, can eat more of our own vegetables, is by buying in bulk (often directly from farmers) at the height of each vegetables' production. We can freeze our own spinach, kale, beans, cauliflower, corn, peas, and tomatoes, for example. We can store carrots, potatoes, beets, garlic, and onions in cold rooms with good ventilation. We can dry, pickle, salt, lacto-ferment, and can our favourite veggies. Yes, it is extra work, but it can be fun and rewarding too – especially if it is done as a social event.

Transportation costs

The greenhouse gas emissions from importing vegetables into Nova Scotia are also listed in Table 49. For every kilogram of lettuce or peppers or tomatoes we import, about three-quarters of a kilogram of carbon dioxide equivalent greenhouse gas emissions are being produced, just for the *transportation* of vegetables we can grow here. Transport Canada (2008) estimated the full costs of transportation, including infrastructure capital costs; infrastructure operating costs; carrier/vehicle costs; congestion delay costs; accident costs; and environmental costs (these included GHG, noise, and air pollution). For every kilometre that one tonne of goods is transported by truck, the full cost is 22 cents. This may not seem like much, but it adds up quickly. For example, we import 25.6 million kg of tomatoes (in all forms). This generates \$20.6 million in costs every year.¹⁷⁵

Figure 27 shows the average weighted distance of several food items, and Figure 28 shows the weighted GHG emissions. Distances and GHG emissions are averaged for the year (2007) and weighted to reflect how much of the product is coming from each place (distance). All products produced within Nova Scotia are assumed to be traveling an average of 350 km and thus have GHG emissions of 0.071 kg CO₂-equivalent per kg of product. Local food products, therefore, would barely register on the graphs. These figures allow us to see the impact different products have, relative to each other.

¹⁷⁵ These estimates are based on the following data pulled from Statistics Canada CANSIM tables 001-0013 and 001-0014 and the Canada Food Stats Database 23F0001XBB: Fresh tomato imports in 2007: 5,462,787kg. Average distance transported: 4543km. These two amounts multiplied, divided by 1000 gives 24,817,441 tonne-km, multiplied by the full-cost of transportation (\$0.22) = \$5,459,837. Processed tomato imports in 2007: 20,116,857kg. Average distance transported: 3421km. These two amounts multiplied, divided by 1000 gives 68,819,768 tonne-km, multiplied by the full-cost of transportation (\$0.22) = \$15,140,349. Combined, the cost is \$20,600,186.

Figure 27: Average Weighted Distance of Imported Food Items, 2007¹⁷⁶

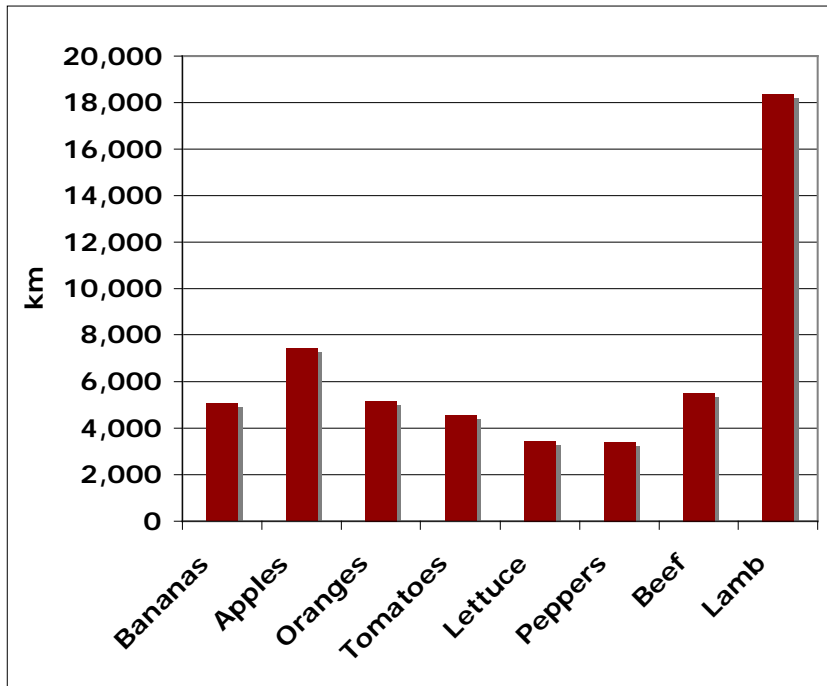
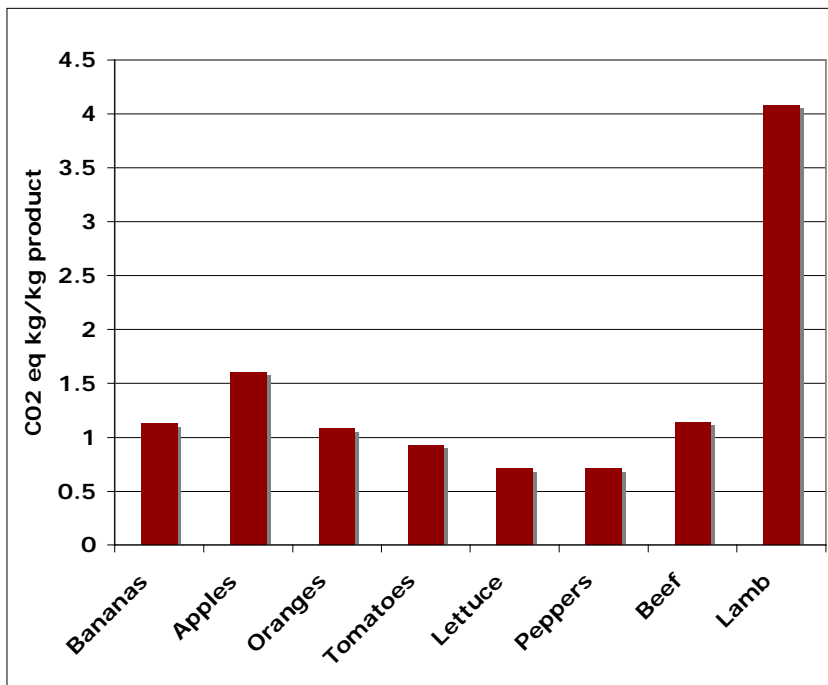


Figure 28: Average Weighted GHG Emissions of Imported Food Items, 2007



¹⁷⁶ For Figures 27 and 28, please see the chapter on Distance Traveled and Emissions of a Food Basket, for data sources and methodology.

Tomato Example

August and September are prime times to stock up on tomatoes grown in Nova Scotia. We know that tomatoes picked when they are fully ripened taste so much better than tomatoes picked before they are ripe and shipped long distances. Tomato varieties selected for shipping long distances are generally tasteless and unappetizing compared to the local vine-ripened goods.

When asked if she felt threatened by home gardeners producing tomatoes, a market gardener in Selma, Nova Scotia stated that on the contrary, she encouraged it. She explained that once people know what a real tomato tastes like, they'll be far less likely to buy imported product, and far more likely to seek out the locally-grown tomatoes like the ones she grows.¹⁷⁷

There was a time when we only ate fresh tomatoes for two or three months a year. The rest of the year we ate frozen or canned or dried tomatoes. But those three months a year when tomatoes could be had fresh were heavenly. Now when tomatoes are available year-round in grocery stores, most of them are inferior. Is this progress?

New unheated greenhouses are allowing for an efficient extension of the season so we can have fresh Nova Scotia tomatoes for 5 months per year.

Fresh tomatoes

At present (2007 estimate), total NS fresh tomato production is equal to 24% of what we consume. Out of that, 22% of the fresh tomatoes are grown in greenhouses¹⁷⁸, and 2.2% are grown in the field.

In the past, a higher percentage of the field-tomatoes we consumed were grown in NS. For the period between 1987 and 2008, 1996 showed the highest percentage (11.9%) of field tomatoes consumed were grown here. If we had figures for earlier years, it is likely more of the tomatoes we ate were home-grown.

Fresh tomatoes imported into NS create transportation emissions of 0.928 kg CO₂-equivalent/kg of product. They travel an average of 4,543 km.

Canadians eat an average of 7.7 kg of fresh tomatoes per year. That works out to a total of 7,209,697 kg consumed in Nova Scotia¹⁷⁹. 76% of those tomatoes are imported, for a total of 5,479,370 kg. That means we import 5,479 tonnes an average of 4,543 km which gives us 24,891,097 tonne-km. The total cost of this transport is \$5.5 million per year. Most of this cost is not paid for by the company transporting the goods. This public subsidy causes us to import more tomatoes than we would if transport companies were paying the full/real cost of the transportation.

¹⁷⁷ Nancy Roberts, Four Seasons, *personal communication*.

¹⁷⁸ We don't know what proportion of the tomatoes are from heated or unheated greenhouses.

¹⁷⁹ Average consumption from Statistics Canada's Canada Food Stats Database 23F0001XBB multiplied by the population of Nova Scotia.

Canned tomatoes

For regular canned tomatoes, the weighted average GHG emissions for transportation per kg of product is 0.716 kg CO₂ equivalent. Canned tomatoes travel an estimated average of 3,421 km to get to Nova Scotia stores. The full cost of transporting these tomatoes is \$15 million per year.¹⁸⁰

Nova Scotians eat an average of 6.66 kg of canned tomatoes per year and 14.82 kg of pulp, paste, and puree tomatoes per year. That works out to a total of 6,238,947 kg canned tomatoes and 13,877,910 kg pulp/paste/puree tomatoes.

Estimates presented in Table 50 show that Nova Scotians consume a total of 27.3 million kg of tomatoes per year. The amount imported is 25.6 million kg and domestic production is 1.7 million kg (6.4%).

Table 50: Tomato Consumption, Imports, and Production in Nova Scotia in 2007¹⁸¹

Kind of tomato	Tomato consumption		Tomato imports to NS		Domestic tomato production
	Average per person (kg)	Total in NS (kg) ¹⁸²	Weighted avg distance (km)	Weighted avg ghg emissions (kgCO ₂ -e/kg product)	% of consumption
Fresh	7.70	7,209,697	4,543	0.928	Greenhouse: 22.03%
					Field: 2.20%
Canned	6.66	6,238,947	3,421	0.716	0
Pulp, paste, puree	14.82	13,877,910			0
Total	29.18	27,326,554			6.4%

Tomato consumption (kg)	Tomato imports (kg)	Domestic tomato production (kg)
27,326,554	25,579,644	1,746,910

Improving the domestic situation

We do have the potential to grow more of our own tomatoes. Tomatoes can be grown in the cities, on farms close to the city, and on farms where the growing conditions are particularly favourable. We can also extend the season by growing tomatoes in heated and non-heated greenhouses.

¹⁸⁰ See footnote #175 for the calculation.

¹⁸¹ Derived from Statistics Canada's CANSIM tables 001-0013 and 001-0014 and the Canada Food Stats Database 23F0001XBB. Please see the chapter on Distance Traveled and Emissions of a Food Basket, for data sources and methodology

¹⁸² Average consumption per person, multiplied by the population of NS in 2007: 936,698.

If people made a point of buying local tomatoes in season, especially if the season is extended in non-heated greenhouses, then that would bring benefits to local farmers. As an additional step, people could buy extra local tomatoes and preserve them for the months when no fresh tomatoes are available.

Fresh production, with the help of season-extension, could run for 5 months from July through November, so we would need to use processed tomatoes for 7 months (or buy greenhouse tomatoes). Estimated average annual consumption of fresh and processed tomatoes in 2007 in NS is 29.18 kg/person. If tomato consumption is roughly equivalent in each month of the year, we need to process 17.02 kg of tomatoes per person for the cold months. Here we will compare home freezing and canning as a way to preserve this amount of tomatoes. See Table 51 for a summary of results. Drying tomatoes is not yet included in the comparison.¹⁸³

Table 51: Comparison of Imports with Two Ways to Preserve 7 Months of Tomatoes (17.02 kg) for each Nova Scotian

	Import ¹⁸⁴	Home Freezing ¹⁸⁵	Home Canning ¹⁸⁶
Greenhouse gas emissions (kg/person/year)	15.79 kg (for transport)	35 kg	5.04 kg
Benefit	Easy for the consumer	Local agriculture Better flavour Convenient	Local agriculture Better flavour Convenient
Cost	Full social/environmental cost of transport: \$0.22/tonne-km ¹⁸⁷	\$3.85 per person for the electricity used to freeze the	\$0.55 per person for the electricity used to can the tomatoes

¹⁸³ Surely we could figure out how to dry large quantities of tomatoes in some kind of greenhouse arrangement or other solar design. This would likely be the most energy and greenhouse gas efficient arrangement for tomato preservation.

¹⁸⁴ If we import fresh tomatoes for 7 months of the year, then 0.928 kg GHG CO₂-equivalent emissions * 17.02 kg of tomatoes = 15.79 kg CO₂-e emissions per person per year.

¹⁸⁵ Multiply 17.02 kg of tomatoes per person by 4 for a household sharing the freezer: (17.02*4 people) = 68.08 kg (or 150 lbs) tomatoes per household, which would just fit in a 5 cubic foot freezer. A 5 cubic foot efficient chest freezer uses 240 to 242 KWh of electricity annually, and has an expected lifetime of 21 years (Natural Resources Canada 2007 EnerGuide Appliance Directory). 240 KWh divided by 4 people = 60KWh/person *7/12 of the year when it is running= 35 kWh/person per year. That is equivalent to 35 kg emissions per year. (35* 1 kg CO₂ is produced for every 1 kWh of electricity from a coal-fired power plant in NS). It would cost roughly \$24/year to run this freezer (Natural Resources Canada 2007 EnerGuide Appliance Directory). Each kWh of electricity costs about 11 cents in Nova Scotia.

¹⁸⁶ An electric stove-top uses about 230 kWh of electricity per year (Natural Resources Canada 2007 EnerGuide Appliance Directory). Divided by 365 days = 0.63 kWh per day. It is likely the average use of a stovetop per day lasts approximately half an hour. If the average person is using 17 kg (37.5 lbs) of processed tomatoes per year, then they would need to do three (7 bottle) batches of canned tomatoes (7 * 750ml jars * 2lb each * 3 batches = 42 lbs) to achieve a little more than their 7-month supply. To process three batches of tomatoes would take approximately 4 hours of stove-on time. That would be equivalent to 8 days average use, or (0.63*8) 5.04 kWh. This amount of electricity use would lead to (5.04 kWh*1 kg CO₂-e/kWh) or 5.04 kg CO₂-e/person per year.

¹⁸⁷ \$5.5 million transport full costs, including GHG emissions for fresh tomato imports. \$15.1 million for processed imports for a total of \$20.6 million

	Total cost of \$20.6 million. Or about \$20 per person	tomatoes (35 kWh)	(5.04 kWh) *Takes time
	\$1.50-\$2.50/lb fresh ¹⁸⁸ ~ \$0.75/lb canned	U-pick @ \$0.50/lb Or bulk @ \$0.75/lb	U-pick @ \$0.50/lb Or bulk @ \$0.75/lb

Home freezing of locally-produced tomatoes produces more GHG emissions at 35 kg CO₂-e per person than importing those tomatoes fresh, at 16 kg CO₂-e per person. Home canning tomatoes produces the fewest GHG emissions of the three options compared, at 5 kg CO₂-e per person. Freezing uses a lot of energy because the freezer is on every day for months. The advantage of freezing is it takes almost no time to put tomatoes in bags and stick them in the freezer; local field tomatoes in peak season would likely be very high quality and full of flavour; and having tomatoes in the freezer is more convenient than going to the store to get them.

Canning produces the fewest greenhouse gas emissions of the three off-season tomato options. This is surprising, since home canning is such an intensive, and hot process. Once the canning process is completed, no further energy is required. Canning field grown local tomatoes generates great tasting jars of tomatoes. They are convenient because you take them off the shelf, remove the lid, and they are ready to use. No thawing or shopping is involved. The energy-efficiency of industrial canning is likely far higher than home-canned tomatoes, but that option is not evaluated here.

As noted in Brodt, Chernoh & Feenstra (2007), industrial canning of vegetables can require as much as twice the energy as freezing, due to the high energy use associated with manufacturing steel and aluminum cans, as well as glass jars. However, it is important to look beyond the initial processing stage. Frozen foods must stay frozen throughout their life cycle, and the result can be much higher energy use than is associated with canning. Additionally, the canning materials can be recycled or reused.

In terms of costs, the least expensive of the three home options evaluated is home-canning, at \$0.55 per person per year for the electricity used to can the tomatoes. The tomatoes themselves would be about \$0.75/lb bought in bulk at peak season.¹⁸⁹ For 17.02 kg tomatoes per person (37.52 lbs), this would cost \$28.14 plus \$0.55 for the electricity: \$28.69. Canning equipment and glass jars would be an extra one-time cost of about \$40, and they could last more than 10 years, so we add \$4.00/year. The energy for canning produces 5.04 kg CO₂-e/person per year. A mid-range estimate for the real cost of one tonne of CO₂-e is valued at \$45¹⁹⁰ so we'd have to add \$0.23. The grand total for home canning is therefore \$32.92 per person. Canning also takes time, which has a value too. The value of time is very subjective, and we leave it to the reader to add whatever value makes sense to them for the time it would take.

¹⁸⁸ These prices are based on a quick survey of imported tomato prices in September 2008.

¹⁸⁹ Estimate from Elderkins, Wolfville NS, September 2009.

¹⁹⁰ Walker et al 1999, p. 25.

Freezing would cost more than canning. In this case we add \$3.85 to the cost of the tomatoes for electricity. The estimated value of greenhouse gases produced in the generation of the electricity would be \$1.58. Plastic bags for 17 kg of tomatoes would cost at most \$3.00. This gives us a total of \$36.57 per person. The cost of a freezer and the value of the time it takes (considerably less than the canning option) would have to be added according to each person's circumstances.

Buying imported fresh tomatoes from the store works out to about \$20 per Nova Scotian for the full costs of transporting those tomatoes by truck (see Table 51 for calculations). If we assume that the price for imported fresh tomatoes is \$2.00/lb, the 37.52 lbs would cost \$75.04, plus \$20, for a total of \$95.04 per person. This is almost three times the cost of canning or freezing local tomatoes, and we haven't included the cost of going to the store to buy them. Buying imported tomatoes canned in tins for \$0.75 per lb would come to \$28.14. The full cost of the transport would add \$20, for a total of \$48.14. Still a higher cost than the local tomatoes, but lower than the fresh tomato option.

A fourth option for getting tomatoes in the off-season is to buy them from local producers who are growing them in heated greenhouses or 'hothouses'. This is an important business in Nova Scotia, but time and resources do not permit their inclusion in the comparison.

Two studies, one from the UK (Smith et al, 2005) and one from Sweden (Carlsson-Kanyama, 1997), concluded that growing tomatoes in Spain and shipping them to the UK and Sweden, respectively, was more energy efficient than growing them locally in heated greenhouses. Energy used in greenhouses outweighs energy used in transport. There are, however, several caveats. The UK study noted that British greenhouses tend to be glass structures and in Spain, while not heated, the tomatoes are covered in plastic structures that have a relatively short lifespan. The energy use to produce each type of structure was not taken into account. **Additionally, the use of renewable energy to heat the greenhouses would reduce their environmental impacts.**

Currently we eat 27.3 million kg of tomatoes, but we only produce 1.7 million kg. Therefore we import 25.6 million kg. This works out to about \$56.3 million¹⁹¹ in potential income to local farmers if Nova Scotians switch to better-tasting locally-grown tomatoes. Since the employment benefits per \$1,000 of agricultural output is 0.0213 (Roberts et al 2005), eating 100% local tomatoes would create an estimated 1,200 jobs. In addition to the economic benefits of buying locally-produced tomatoes, there are a number of social benefits. These include connection and support to the farming community, better quality tomatoes, and possibly an injection of useful skills and social interaction if people got together in the fall to purchase and preserve tomatoes. Good-tasting local tomatoes could encourage people to eat more than they do now, which is a good thing because currently Nova Scotians are not eating enough vegetables (Healthy Eating Action Group 2005).

¹⁹¹ At a low price of \$1/lb or \$2.20/kg. Most tomatoes are sold for more, which would generate additional income for farmers.

Often people think that buying locally produced food is more expensive than imported food. Here is an example that clearly shows how the local option is less expensive personally and socially. When we include the real costs in a comparison of tomato buying options for the 7 months they are not available in Nova Scotia, the least expensive and most benefit-generating option is to buy local tomatoes in bulk at the peak of the season and preserve them for home use (\$32.92 per person). This option also produces the fewest GHG emissions. The most expensive option is to buy imported fresh tomatoes (\$95.04 per person) (Table 52).

Table 52: Summary Comparison of Imports with Two Ways to Preserve 7 Months of Tomatoes (17.02 kg) for each Nova Scotian¹⁹²

	Import Fresh	Import Canned	Home Freezing	Home Canning
Greenhouse gas emissions (kg CO₂-e /person/ year)	16 kg (for transport)	16 kg (for transport)	35 kg (for electricity to freeze)	5 kg (for electricity to preserve the tomatoes in glass jars)
Cost per person	\$95.04 plus the cost of grocery shopping trips	\$48.14 plus the cost of grocery shopping trips and the costs of manufacturing and disposing of tins	\$36.57 plus the cost of a freezer and the cost of a trip to purchase bulk tomatoes	\$32.92 plus the cost of a trip to purchase bulk tomatoes

Apple Example

Nova Scotia farmers produce a wide variety of fruit. We are historically best known for apples, and we still export apples out of province. Our production of apples, divided by fresh consumption, is 390%. That means that we produce roughly four times the amount we consume¹⁹³. Yet, we import about 50% of the apples we eat. The weighted average distance traveled by apples imported from out of province is 7,443 km. This is a prime example of redundant trade. We are importing apples, as we are simultaneously exporting them.

Because of advances in apple storage technology, Nova Scotia apples can be harvested in the fall and stored in controlled atmosphere conditions so they can be made available all year. Apparently we import apples because of changes in consumer taste. Consumers want different varieties of apples that are only grown in other parts of the world. Or so we are told. When the apple growers of Nova Scotia did blind taste tests with consumers,

¹⁹² See text for explanation of calculations

¹⁹³ If we count processed apple products like juice, cider, or sauce, we produce roughly twice what we consume (182%).

they discovered that people can really only distinguish between a tart and a sweet apple (Baldwin, D. *pers. comm.*). Since we grow both kinds of apples in this province, we should be able to satisfy all of our consumer demand for this fruit.

On average, each Canadian eats about 10 kg of apples per year. Compare that with other kinds of fruit in Table 53.

Table 53: Fresh Fruit Consumption Per Person, Per Year

Fruit	Annual Per Capita Consumption (kg)¹⁹⁴	Canadian Imports as a % of Net Supply¹⁹⁵	NS self-reliance (fresh & processed)
Apples	10.6	344%	181%
Bananas	14.0	458%	
Berries, other	0.3	11%	?
Blueberries	1.1	24%	1104%
Cherries	0.7	22%	?
Cranberries	0.6	20%	?
Grapes	4.9	159%	
Melons	10.5	343%	?
Oranges	9.5	310%	
Peaches	1.4	40%	4%
Pears	2.2	78%	20%
Pineapples	3.0	99%	
Plums	0.8	26%	?
Strawberries	3.1	94%	32%

Figure 29: Average Weighted Distance of Imported Fruit¹⁹⁶

¹⁹⁴ Statistics Canada. 2007. Canada Food Stats. Emailed directly. Fruitfrsh.pdf

¹⁹⁵ Statistics Canada. 2007. Canada Food Stats. Emailed directly. Fruitfrsh.pdf

¹⁹⁶ Derived from CANSIM tables 001-0009 and the Canada Food Stats Database 23F0001XBB.

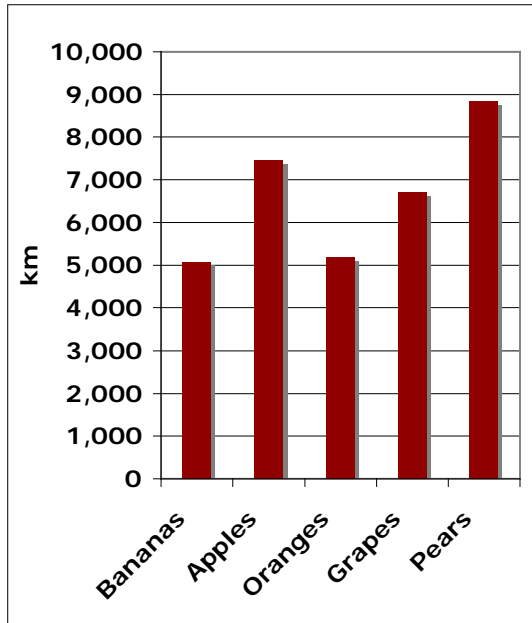


Figure 30: Average GHG Emissions of Imported Fruit¹⁹⁷

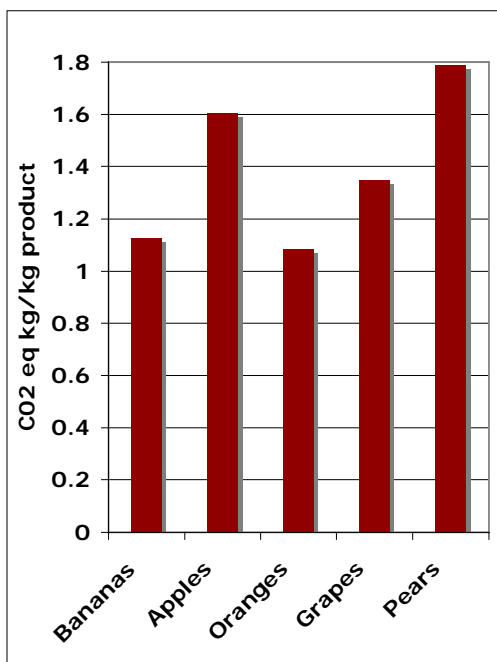


Table 54: Estimate of Consumption of Northern Fruit in NS

Fruit	NS consumption (kg/year)
Apples, fresh	9,932,596

¹⁹⁷ Please see the chapter on Distance Traveled and Emissions of a Food Basket, for data sources and methodology

Apple juice	6,584,987
Blueberries	1,027,440
Peaches	1,340,031
Pears	2,074,309
Plums	783,776
Strawberries	2,860,190

To estimate the cost of just *transporting* apples to Nova Scotia, the estimated total consumption of apples (Table 55) is multiplied by 50% (the approximate percentage of imports) to get the approximate weight of apples imported: 4,966 tonnes. This is multiplied by the average weighted distance apples are shipped (7,443 km) to get 37million tonne-km. This is multiplied by \$0.22 per tonne-km¹⁹⁸ to estimate the real cost of importing apples we can produce ourselves: \$8 million per year. To gain a full picture of the cost of redundant apple trade, the cost of shipping our apples *out* of province would have to be included. The total annual GHG emissions for importing apples is 7,961 tonnes CO₂-equivalent (Table 55).

Table 55: Real Cost and GHG Emissions to Import Apples to Nova Scotia

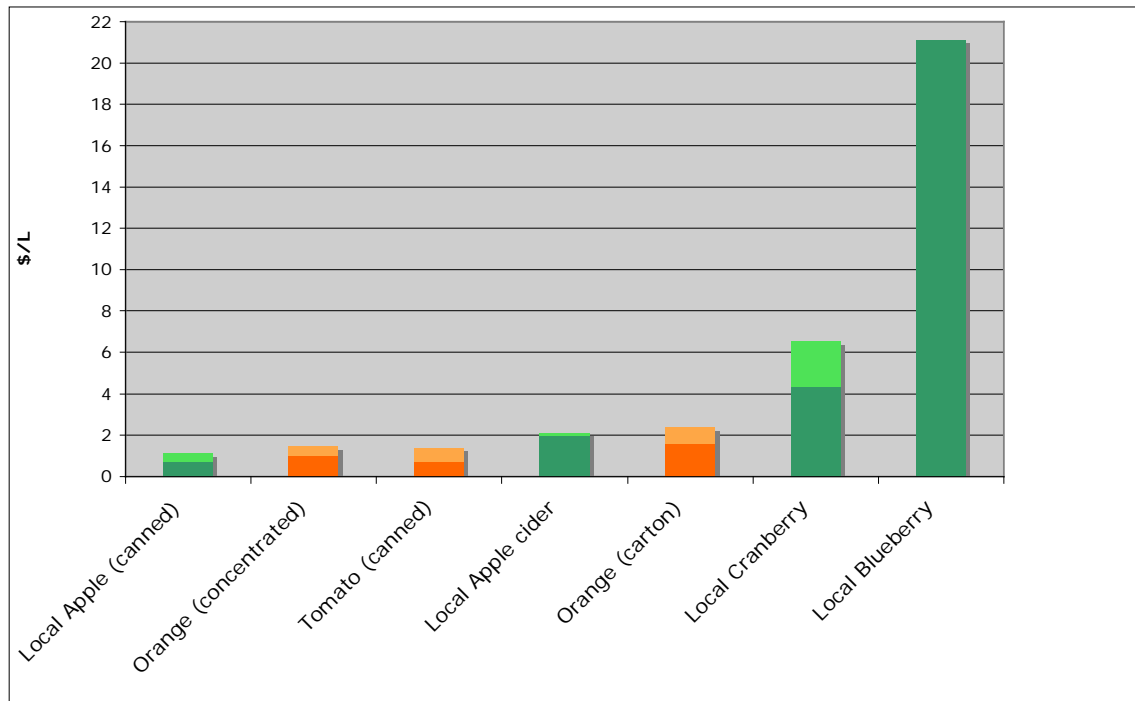
4,966,298	kg imported apples
4,966	tonnes imported apples
7,443	km average weighted distance traveled of imported apples
36,964,156	tonne-km
8,132,114	\$ real cost
1.60	kg CO ₂ -e emissions per kg product
7,960,976	kg CO ₂ emissions
7,961	tonnes CO ₂ emissions
45	\$ per tonne CO ₂
358,244	Cost (\$) of just the CO ₂ emissions

In addition to redundant trade in apples, Table 54 shows us how much northern fruit is eaten that we don't grow here. Besides apples, the top fruits eaten are bananas, melons, and oranges. Although we produce some melons in Nova Scotia, we don't produce any bananas or oranges. Table 54 shows all the fruit we *can* produce here, along with consumption estimates. We are well known for producing blueberries, but we also produce raspberries, strawberries, plums, pears, and peaches. There seems to be a tradition of picking and preserving strawberries when they are in season (by freezing or making jam). It is a social event. This tradition could be reclaimed for our other northern fruits. Buying directly at U-picks can provide a day out on the farm, reasonably priced fruit, and a freezer full of local fruit for smoothies all year.

¹⁹⁸ Transport Canada's total cost estimate of road freight (Transport Canada 2008). Not all apples are imported by road freight, but this is a start for estimating the real cost for transporting apples to Nova Scotia. The total cost estimate includes infrastructure capital costs, infrastructure operating costs, carrier/vehicle costs, congestion delay costs, accident costs, and environmental costs (these include GHG, noise, and air pollution).

It is true that bananas, at \$0.89/lb¹⁹⁹ are less expensive than frozen blueberries, at \$3.20/lb²⁰⁰. Local fruits are not always more expensive. Figure 31 shows price ranges for a number of different juices available in three Halifax grocery stores. Local juice can be the least expensive, as in the case of canned apple juice, or the most expensive, as in the case of pure blueberry juice. The local juices are shown in green, and the imported ones are shown in orange. The price range for each item (if there is one) is shown using the lighter colour on the top of each bar.

Figure 31: Juice Prices per 1L, November 2008



With such an array of locally-produced fruit available, especially in the summer and fall, it is a shame to pass it up for imported fruits all the time.

Conclusion

If importers had to pay the full costs of transporting tomatoes here, the price of imported tomatoes would go up significantly. The price tag on imported tomatoes in the store does not reflect the \$20.6 million real cost for transporting tomatoes here. The price tag on local tomatoes does not reflect all the real benefits associated with local agriculture and better quality.

¹⁹⁹ Superstore in Windsor, June 19 2010.

²⁰⁰ Falmouth Fruit and Vegetable Company, June 19 2010.

The tomato example provided above shows the potential for expanding Nova Scotia's agricultural production to fill the actual demand (based on consumption statistics) for vegetables. Referring back to Table 49, we see that we could be growing far more asparagus because we only provide 1% of the market. Likewise beans, beets, cucumbers, lettuce, parsnips, peas, and spinach and many other fine vegetables could be produced locally. Yes, we do have only a few months to produce all the food we need to keep our population in vegetables, but the tomato example shows how that can be overcome.

The apple example above highlights the issue of redundant trade. Despite the fact that we produce almost twice the amount of fresh and processed apples that we can consume, we import 4,966 tonnes of apples annually. The real cost of importing apples that we can produce ourselves is \$8 million per year. In addition to apples, we produce blueberries, raspberries, strawberries, plums, pears, and peaches, and thus there is a lot of potential to increase our consumption of fruit that can be grown close to home.

With reasonably easy shifts in our eating and buying patterns, Nova Scotians could enjoy a significant boost in food enjoyment, flavour, nutrition, and health benefits. By eating more locally-grown vegetables and fruit, we can revitalize our farms and agricultural communities. We can save significant amounts of public funds by taking transport trucks off the roads and by putting farmers back on the land. By looking at the costs and benefits of just switching to locally-grown tomatoes and apples, it can be demonstrated that small changes in consumer patterns can have huge impacts in the countryside.

Benefits of Beef Import Replacement

We have certain unique features here, like we can grow grass-fed [beef] a lot better than the West, and we can grow a lot of our meat off grass, but we've got to find a way to promote the local beef and make it unique. Nova Scotia beef are healthy and happy, grown on forage, and we have research that shows that that yellowing of the fat is higher in antioxidants. It's like the blueberries—it's better for you. –Frazer Hunter, Knoydart Farm, 2003²⁰¹

Presently most of the beef we eat in Nova Scotia is imported from distant sources. It is finished in feedlots with grain and other by-products. It would not make sense for us to finish beef here and compete with the feedlot system established in grain-growing regions like the Prairie Provinces. We simply don't have the excess grain needed. However we are missing a great opportunity to replace those imports with locally-grown beef fed on grass and clover – something we are great at growing in Nova Scotia.

The production and consumption of beef has a bad reputation for creating environmental and health problems. Unfortunately, this poor reputation connected with feedlot beef has overshadowed the potential for raising and consuming beef in a way that contributes to agricultural sustainability and good health. People tend to associate the ill effects from industrial beef production with all beef. Actually, community-based, primarily grass-fed beef systems generate many benefits for rural Nova Scotia and for consumers, including affordable beef products.

Highlights of this case-study

- ✓ **Nova Scotians are eating roughly 90-99% imported beef from feedlots.**
- ✓ **Local beef production has great potential for improving soil quality and revitalizing rural communities.**
- ✓ **We have underutilized land and capacity that could be used for beef production.**
- ✓ **If we produced all the beef we eat in this province, farm cash receipts could increase from \$22.5 million to *at least* \$90 million/year and full-year equivalent employment would increase from 448 jobs to about 1,774 jobs.**
- ✓ **On average, beef imported to Nova Scotia creates 1.14 kg of CO₂-equivalent emissions per kg of beef imported, *just for the transportation*. The full cost estimate of this unnecessary transportation is \$30 million per year.**

²⁰¹ Scott & Colman 2008:174

- ✓ **Grass-fed beef meat is a healthy food:** Beef cattle are fed primarily grasses and clover, which makes the meat low in saturated fat, yet high in omega-3 fatty acids, beta carotene/vitamin A, vitamin E, folic acid and antioxidants.
- ✓ **Animal stress is lower** where livestock are grazing compared with feedlot conditions. Ruminants -- cud-chewing animals such as cattle, dairy cows, goats, bison, and sheep -- are designed to eat fibrous grasses, plants, and shrubs—not starchy, low-fiber grain.

The Difference Between Industrial and Community-Based Beef Production

Not all beef is produced in the same way. Much of the beef available in grocery stores is finished on grain, in feedlots, and shipped in from long distances. Meanwhile, much of the grass-fed beef produced in Nova Scotia is sold out of province, or directly to consumers. The local beef is generally produced in a completely different, and more ecological way, than imported feedlot beef. Despite its many advantages, it is not widely available... yet. Once consumers know they have a choice between two different kinds of beef, the system might change to favour locally-grown.

Most of the beef that is imported into Nova Scotia is produced in Alberta. This industrial beef is ‘finished’ in very large feedlots, where cattle are fattened on grains and other food system by-products. Often cattle are pushed to grow faster, using hormones. Antibiotics are used to prevent disease from overcrowding. The animals grow very fast and it is a cheap way to mass produce fat animals for commodity markets.

Producing feedlot beef is, however, environmentally expensive. Manure accumulates around the feedlots, creating a pollution problem. Growing grain to feed cattle contributes significantly to greenhouse gas emissions. Synthetic fertilizer, made with natural gas, is used to grow grains. Grains are an annual crop, requiring yearly tillage, fertilizer, seeding, herbicides, harvest, shipping, and processing – all of which require inputs of fossil fuel. This annual cultivation contributes to soil erosion and greenhouse gas emissions through use of fossil fuel in the creation of fertilizer, for transporting the fertilizer, and using the fertilizer. Tillage also ‘burns’ or oxidizes organic carbon in the soil and releases it as a greenhouse gas.

The cattle are slaughtered and processed in very large, centralized facilities. The meat is packed in boxes and shipped by refrigerated truck to Nova Scotia. The beef finishing and packing industry is owned by corporations that have no connection to our Nova Scotian communities, other than profiting from the money we spend on this imported beef.

In Nova Scotia, most beef is produced on family farms. The animals spend the summer on pasture and are fed hay and other forage in the winter. Farms may or may not choose to finish their cattle by feeding some grain. But the majority of their diet is made up of

grass and clover. When animals are ready, they are slaughtered and processed at inspected facilities throughout Nova Scotia or PEI. Some farmers sell sides or cuts of beef at farm stores, at farmers' markets, or at the farm-gate. When consumers buy beef directly from farmers, they can ask exactly how the beef is produced, and know the money spent stays in the area.

John Duynisveld, a researcher and farmer on the north shore of Nova Scotia explains the logic behind a grass-fed²⁰² beef industry below. He also worked out the costs and revenues of raising grass-fed beef, presented at the end of this case-study.

Here in the Maritimes, we can grow grass, and cows are made to eat grass, so why can't we develop a grass-fed beef market? Based on research at AAFC²⁰³ Nappan, we can produce high quality forages (pasture and stored feed) that can produce adequate gains to finish cattle without grain supplementation. Assuming a 650 lb start weight, it will take about 280 days to finish a steer to 1300 lb live weight on a forage based system, if you can achieve consistently high gains. However, a grain based system takes about 190 days, or 1/3 less time.

Grass-fed Beef Production Has Great Potential For Improving Soil Quality

Beef cattle production helps improve soil quality in two ways: Beef manure is returned to the soil as fertilizer, and growing forage (hay and pasture) for cattle feed keeps soil covered all year to prevent erosion, while building soil organic carbon. The fibrous and extensive roots of forages also add considerably to soil organic carbon by taking carbon dioxide out of the air as they grow. Soil organic carbon is the material that makes soil spongy and ideal for growing plants.

Clover and other legumes in the forage naturally take nitrogen out of the air and put it in the soil, adding to soil fertility. Cattle manure can be used to fertilize fields and replace synthetic fertilizer use. Synthetic fertilizer is expensive both financially and environmentally. The dollar price of fertilizer has been going up because natural gas is used to produce it, and all fossil fuels are tending to go up in price as they become scarce. Synthetic fertilizer also has environmental costs due to the greenhouse gas emissions from its production, use, and delivery, as well as from pollution from leaching when excess is applied.

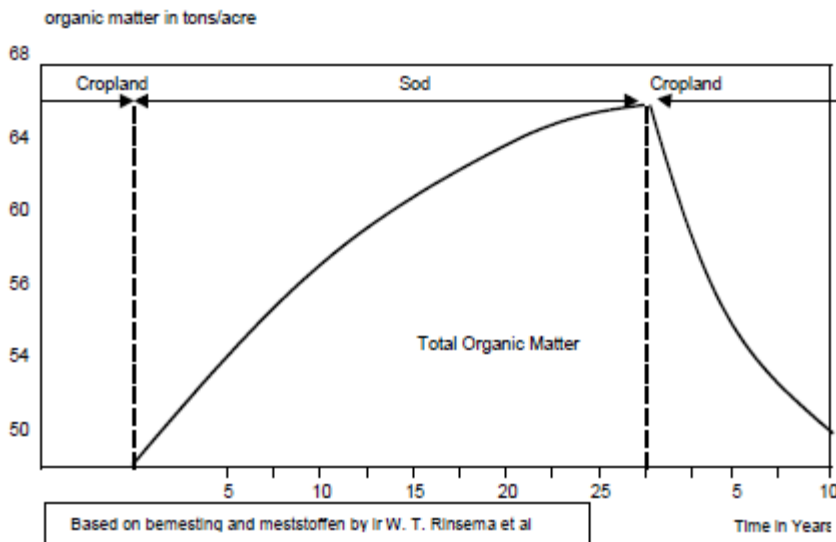
²⁰² American Grassfed Association : "Grass and forage shall be the feed source consumed for the lifetime of the ruminant animal, with the exception of milk consumed prior to weaning. The diet shall be derived solely from forage consisting of grass (annual and perennial), forbs (e.g. Legumes, Brassica), browse, or cereal grain crops in the vegetative (pre-grain) state. Animals cannot be fed grain or grain by-products (starch and protein sources) and must have continuous access to pasture." This definition sums up the general understanding of what grass-fed beef is – no grain in the diet.

²⁰³ Agriculture and Agri-Food Canada (year?)

Integrating ruminant livestock (such as sheep, cattle, and goats) with production of fruit, vegetables, and grains is the most economical way to maintain soil health and productivity over the long run on a farm.

Figure 32 shows that growing hay and pasture (sod crops) improves soil organic carbon over time, while growing other crops can quickly deplete this critical resource.

Figure 32: Organic Carbon (or Organic Matter) in Soil from Forages (or Sod)²⁰⁴



Production of Beef, Relative to Consumption

Unfortunately, much of the beef produced in Nova Scotia is exported to other provinces in the form of live cattle. This means (1) Nova Scotia does not benefit from the processing and retail activity that our cattle generate, and (2) Nova Scotians for the most part are not eating beef produced in this province. If beef producers were supported to change over to a production system geared to the local market, it is possible they could get a better price per pound for their product than they do now. If consumers bought beef directly from producers, it is possible they could get a better price than they are paying now in retail supermarkets (see cost/revenue estimates at the end of this case study).

When we divide total production of beef in Nova Scotia by total average consumption of beef, we get an estimate of production relative to consumption. Table 56 shows this production over consumption estimate for Nova Scotia between 1992 and 2007. In 2007, we produced roughly 26% of what we consume in this province. In 1992 we produced roughly 40% of what we consume. It is likely we could produce close to 100% of what we consume because we have underutilized farm land. We also have beef producers who have cut back on production, but still have the *capacity* to produce. We would, however, need more processing capacity and direct marketing infrastructure than we have now.

²⁰⁴ from Roxbury Farm, 2006

Table 56: Nova Scotia Beef Production Divided by Consumption, %, 1992-2007²⁰⁵

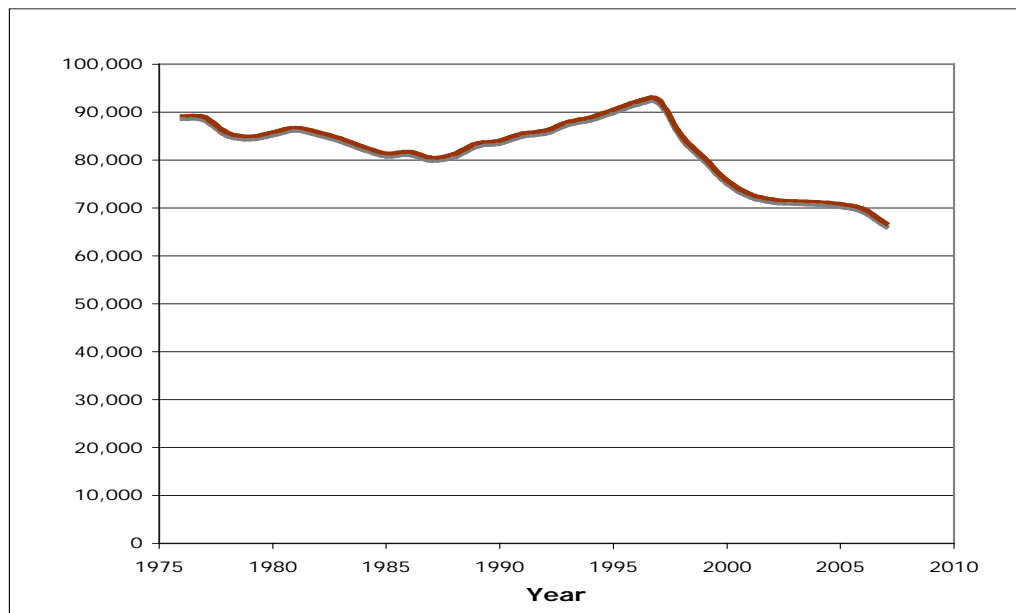
Year	Production/Consumption, %
1992	40%
1993	35%
1994	34%
1995	34%
1996	34%
1997	34%
1998	36%
1999	32%
2000	32%
2001	31%
2002	27%
2003	24%
2004	28%
2005	29%
2006	28%
2007	26%

Since we export so much of the beef that is raised in this province, the question remains: **How much of the beef Nova Scotians eat is produced in this province?** A number of estimates have been made, including one from Frank Foster (a beef producer in Cumberland County); one from Sean Firth (who runs Atlantic Stockyards in Bible Hill); one from the Cattle Producers of Nova Scotia; and one from Statistics Canada for the Atlantic Provinces. Frank Foster estimates that of all the beef we eat in Nova Scotia, only about 1-5% of it is produced locally. Sean Firth estimates that about 10% of the beef we eat is locally produced. The Cattle Producers have stated a similar estimate of 8-10%. Statistics Canada data for Atlantic Canada show that this region is importing 88% of our beef, giving us a figure of 12%. This means that **we are importing between 88 and 99% of the beef we eat in this province.** We are sending our hard-earned food dollars out of the province to buy an inferior product while our beef producers are in danger of going out of business. While this is a travesty, it is at the same time pointing to an opportunity to replace imports with local product that could generate multiple benefits in Nova Scotia.

In Nova Scotia, beef production has been in decline particularly since 1997 (Figure 33). **We could be producing more beef to fill the local market.** In 2009 the demand for local beef was going up, according to beef producers in various parts of the province. This is a positive sign that a gradual increase in demand could serve as an incentive for producers to add beef cattle to their farms, and for the construction of more processing facilities throughout rural NS.

²⁰⁵ Beef production data is from www.gov.ns.ca/agri/marketing/statistics/agriculture/table10-2008.pdf and consumption data is from Statistics Canada's Canada Food Stats Database 23F0001XBB.

Figure 33: Total Beef Cattle, NS Farms, 1976-2007²⁰⁶



Economic Benefits of Replacing Imports with Local Product

In Nova Scotia farm cash receipts from the sale of beef cattle used to be much higher than they are now (Figure 34). Now it is about \$22.5 million/year, but it has been as high as 80 million around 1950 and 1980. **If all imports of beef were replaced by local production, it is estimated that farm cash receipts could increase to at least \$89 million** (Table 57). This is a low estimate based on present income from present production. If beef producers were able to earn more per pound of beef by selling directly to their customers, the farm cash benefits could be several times higher.

Table 57: Estimate of Earnings if we Produced all the Beef we Consume in NS, 2007

Present annual production (number of head) ²⁰⁷	22,800
Present annual yield of meat (kg) ²⁰⁸	7,250,400
Present total farm cash receipts from beef sales (\$) ²⁰⁹	22,535,000
Present total annual consumption of beef (kg) ²¹⁰	28,681,717
Estimated farm cash receipts from total annual consumption (\$)	89,145,770

²⁰⁶ Nova Scotia Department of Agriculture (and Marketing). 1988, 1993, 1997, 2007. Nova Scotia Agricultural Statistics.

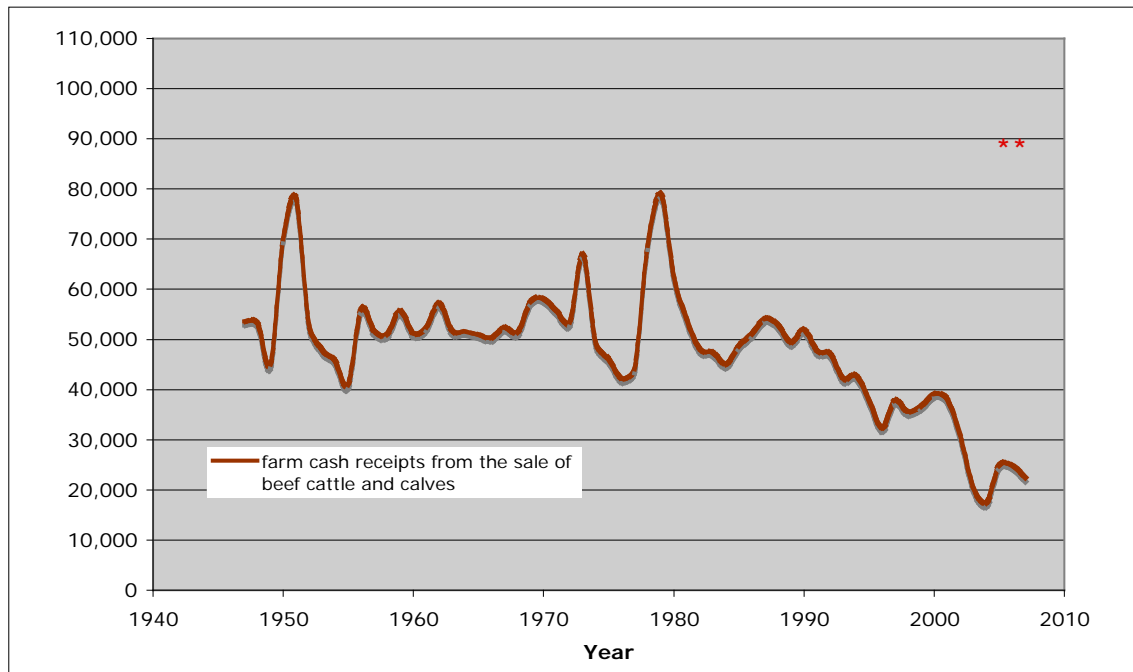
²⁰⁷ Nova Scotia Department of Agriculture 2007. Nova Scotia Statistics 2007.

²⁰⁸ Based on an average meat yield of 318 kg/animal

²⁰⁹ Statistics Canada 2008 Agriculture Economic Statistics, Farm Cash Receipts Cat No 21-011-XIE.

²¹⁰ Statistics Canada 2007. Canada Food Statistics on CD ROM, Cat No. 23F001XCB

Figure 34: Farm Cash Receipts from the Beef Cattle, 1947 to 2007²¹¹ (corrected for inflation and shown in 2007 dollars)



Another benefit of replacing imports with local product is it would increase employment in Nova Scotia. Presently it is estimated that local beef production creates the equivalent of 448 full-time jobs. If we replaced all the imported beef with local beef, the number of full time equivalent jobs is estimated to increase to 1,774²¹².

Transportation costs associated with importing beef

Some people would argue that it is good to have imported beef if it is cheaper than local beef. But when we look at some of the costs associated with those imports, the imported beef may turn out to be more expensive in many ways.

Presently²¹³ we import about 25 million kg of beef every year to Nova Scotia.²¹⁴ The average distance beef travels to get here is 5,524 km. If we assume it is all coming from Alberta, by truck, the fuel use alone would generate 1.144 kg of CO₂-equivalent GHG

²¹¹ Statistics Canada 2008 Agriculture Economic Statistics, Farm Cash Receipts Cat No 21-011-XIE

²¹² Job estimates are generated by multiplying cash receipts by the employment multiplier for livestock in NS of 0.0199 (ATi Consulting 2002).

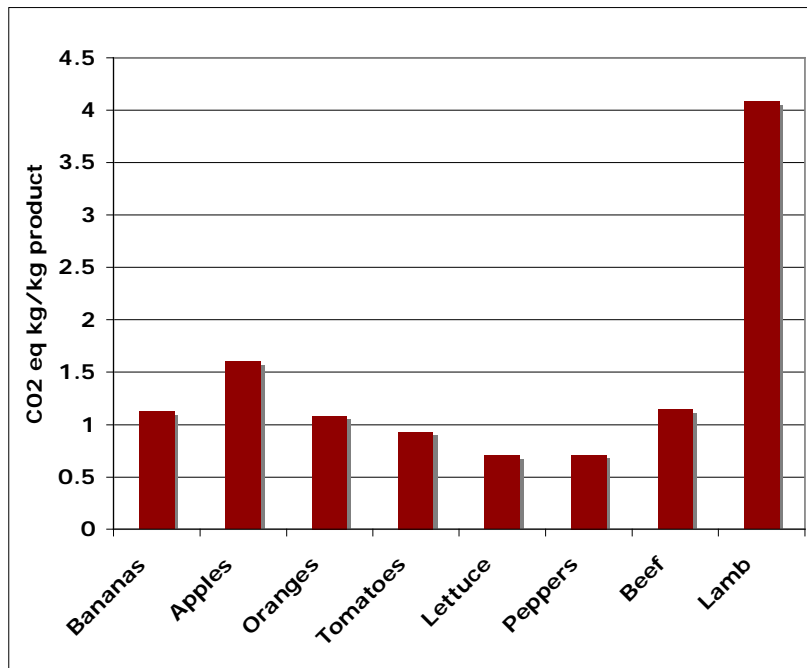
²¹³ 2007 figures

²¹⁴ 28,681,717 kg/yr is consumed (Statistics Canada) * 88% imported (to Atlantic Canada) = 25,239,910 kg imported.

per kg of meat shipped. **The total greenhouse gas emissions for transporting this beef would be 29,000 tonnes of CO₂-equivalents. Eliminating this fuel use by replacing imports would be roughly equivalent to taking 9,271 cars off the road.**²¹⁵ This estimate does not count the extra emissions associated with hauling beef from Nova Scotia to Quebec or Ontario where it is generally finished and slaughtered.

Emissions of 1.144 kg of CO₂ equivalent per 1 kg of beef imported is quite high relative to other imported food items to Nova Scotia (Figure 35).

Figure 35: Weighted Greenhouse Gas Emissions from Transportation of Imported Food²¹⁶



To determine the full costs of beef import transport, the tonne-kilometers traveled to bring this beef to Nova Scotia are multiplied by the Transport Canada (2008) cost factor for trucking (which gives us an estimate of the full cost of freight transport including infrastructure capital costs, infrastructure operating costs, carrier/vehicle costs, congestion delay costs, accident costs, and environmental costs²¹⁷). This gives us a full cost estimate of **\$30 million dollars per year, to bring a product to Nova Scotia that we can produce here.**²¹⁸ Again, this does not include the full costs of hauling Nova Scotia beef out of the province. The cost of this redundant trade for Canadian taxpayers is adding up.

²¹⁵ Toyota corolla: engine size 1.8, 4 cylinder, automatic transmission. Typical fuel consumption of 1,360 L/yr (= \$1,360/yr) CO₂e/yr= 3128 kg. 29,000 tonnes CO₂-equivalents = 29,000,000kg divided by 3128= 9,271 Toyota Corollas.

²¹⁶ See chapter on Distance Traveled and Emissions of a Food Basket for methodology and calculations.

²¹⁷ Including GHG, noise, and air pollution (Transport Canada 2008).

²¹⁸ 5524 km * 25,239.91 tonnes of beef imported* \$0.22 per tonne-km = \$30,673,558

Environmental effects of beef production

If we shift from primarily grain-fed beef from Alberta to primarily grass-fed beef from Nova Scotia, aside from the transportation, what impact will that shift have on the environment? There is evidence to show that grass-fed beef production in Nova Scotia would not contribute any more GHG emissions than feedlot beef production in Alberta, and could possibly contribute less (Manning 2009; Glover et al. 2007; Clancy 2006; Fredeen et al. 2004). But the issue is being debated.

There is also evidence to show that eating meat from ruminant animals contributes significantly to GHG emissions (Pimentel 2008; Weber & Matthews 2008; Garnett 2008). It does appear that conventional beef production with heavy use of concentrate feed and manure treated as a waste product instead of a resource, would have undesirable environmental effects.

In Nova Scotia we can grow excellent forages to feed ruminants, reducing the need for grain feed, and the forages themselves help sequester carbon in the soil, which balances emissions, producing very little net effect in the system as a whole. The roots of perennial forages are sloughed off when the above-ground parts are grazed. This contributes to carbon building up in the soil, and deeper rooting as aboveground parts regrow. Deeper roots access more minerals for better beef health (Manning 2009; Glover et al 2007). Beef protein production on good pasture is significantly less energy intensive than producing grain-fed animal protein (Pimentel 2008: 466).

Grain requires tillage to get established, control weeds, and incorporate residues. In Manning (2009), tillage systems were found to be net contributors to global warming, and the worst offenders were the annual crops: corn, soybeans and wheat farmed with conventional methods. Meanwhile, fields of perennial crops in the same study pulled both methane and carbon dioxide from the atmosphere and stashed it safely in the soil. Even though we harvest meat from the pastures each year, still the soil grows richer and holds more carbon

In a Life Cycle Analysis of dairy systems in Nova Scotia, Arsenault (2006) discovered that the high environmental impacts of grain feed production are due to the inputs of chemical fertilizers, the transportation associated with inputs into the feeds, and the delivery of feeds to farms. Increasing grazing periods on pasture land can help decrease environmental impacts, as it reduces the need for concentrate feeds and stored silage. Additionally, increasing the percentage of nitrogen-fixing legumes in the forage mix can reduce the need for nitrogen fertilizers.

Michael Main, who works at the Nova Scotia Agriculture College in Truro has been measuring GHG emissions from dairy ruminants for several years. He writes in August 2009: “My work showed relatively little difference in net GHG production between milk produced on high forage diets using maximum pasture, versus confinement fed, more heavily grain fed cattle” (*personal communication*). In an article summarizing Main’s

work, Boehm (2004) concludes that “well-managed forage systems can compete financially with higher-input [grain] systems, while reducing soil depletion, erosion, nitrate leaching, and emissions of greenhouse gases. The last of these findings flies in the face of dairy science dogma, precisely because Main is looking at the whole farm and not focusing solely on ruminant methane emissions.” In other words, methane (a greenhouse gas that is 23 times more potent than CO₂) emissions go up when a cow is fed a higher percentage of forage and go down when a cow is fed a higher percentage of grain. But if the GHG sequestration effect of *growing* the forages and grain is taken into account, a high forage diet results in *lower overall* GHG emissions. “High production efficiency from grain feeding comes with costs: low-level health problems such as acidosis and laminitis, higher feed costs, and environmental costs that go beyond the issue of a single greenhouse gas.” Feeding forage, on the other hand, comes with benefits such as healthier animals; and reduced tillage. Forage legumes reduce the need for nitrogen fertilizer. As cattle graze on pasture, their manure decomposes right where it is needed, reducing the load in manure storage lagoons which are major sources of methane emissions.

Pelletier et al (2010) published a Life Cycle Analysis of three beef production systems in Iowa. They concluded that the feedlot system had fewer environmental impacts than the pasture system. On a per kg of liveweight basis, the feedlot system used less energy at 38.2 MJ/kg while the pasture system used 48.4 MJ/kg. For greenhouse gas emissions, the feedlot system emitted 14.8 kg CO₂-e/kg and the pasture system 19.2. While the feedlot system had 104 g PO₄-e eutrophication emissions, the pasture system had 142. And finally, the ecological footprint was higher for the pasture system at 120 m² vs. 84.3 for the feedlot system. It is true that cattle in feedlots grow faster than cattle on pasture, making resource utilization more efficient per kg produced. A thorough reading of the study shows that when the authors include soil carbon sequestration in their model, the pasture system has the lowest GHG emissions – reduced to 10 kg CO₂-e/kg beef produced. The results from this study are quite site-specific, as acknowledged by the authors, and may not be applicable to Nova Scotia conditions. Feedlots in places like Iowa and Alberta are more efficient (because of nearby grain production) than feedlots would be in Nova Scotia. It is expensive for us to transport grain feed such great distances. Finally, the Pelletier study shows average daily gains in the pasture scenario of 0.6 kg/day, while average daily gains on well-managed Nova Scotia pasture is 0.95 kg per day, which would significantly change the results reported by Pelletier et al (2010) (see production and revenue figures at the end of this case study).

Garnett (2009:5) points out that it is important to have grass-fed ruminant livestock for the maintenance of pastures that are GHG sinks. “Livestock have an important role to play in maintaining pasture land and, as such, in preventing it from being used for another, carbon releasing purpose.” She goes on to explain that livestock can even *add* to the carbon stock of the soil. She cites Allard et al. (2007) who found that on temperate unfertilized grasslands where cattle are reared without the use of feed inputs or additional fertilizer, the carbon sequestering role of livestock outweighs their methane and nitrous oxide emissions.

Livestock is also important for long-term soil fertility. Garnett (2009:6) points out simply that manure is a better alternative for fertilization than synthetic fertilizers. “Manure can improve the quality and fertility of soil and it has been shown that soil fertilised with manure is more biologically active and fertile than soil fertilised by mineral fertilisers alone” (Fließbach et al., 2007 cited in Garnett 2009).

Pastures also provide good wildlife habitat relative to crop land. Statistics Canada reports that there has been a decrease in wildlife habitat on Canada’s farms associated with an increase in cropland and a decline in species-rich natural pasture (Statistics Canada 2009:29).

Health effects of local grass-fed beef

It is likely that on average, people are eating more beef than they need to. Eating less beef overall, but more locally-produced grass-fed beef, would have health benefits. In moderation, compared with feedlot beef, grass-fed meat is showing the following benefits that could reduce health care costs and suffering.

- Grass-fed meat is low in saturated fat, yet high in omega-3 fatty acids, beta carotene, vitamin E, folic acid and antioxidants. Conjugated linoleic acid (CLA), thought to reduce the risk of breast cancer and diabetes, also is higher in pastured meat. A Nova Scotia study shows that beef finished on pasture has higher levels of beneficial fatty acids than grain-fed beef, with few differences in meat quality (Duynisveld et al. 2006:535).
- Grass-fed livestock don't require regular administration of antibiotics to combat the spread of infection that is common in densely packed feedlots (NFU 2008:25).
- Grass-fed meat production practices do not typically include the injection of hormones to spur growth (NFU 2008:25).
- Grass-fed meat is much less likely to harbor acid-resistant E.coli (Manning 2009).

Local beef and farm communities

Across Canada, farmers are getting a smaller percentage of the beef dollar over time (NFU 2008:12). In 1999 they received 24% and in 2008 they received 16%. Consumers are paying approximately the same for steak and hamburger as they did 20-30 years ago (when adjusted for inflation). Farmers are receiving about half of what they did 20-30 years ago (NFU 2008:22). A more economically viable beef system supplying the local market is needed immediately to keep producers from selling out and to retain wealth and employment in rural communities. Cost/revenue scenarios for local grass-fed systems are presented at the end of this case study. By selling direct to customers, farmers may be able to reclaim their share of the local market, and a higher share of the beef dollars spent in the province.

As the cost of synthetic fertilizer goes up, there will be an increased need for livestock manure to keep our soils fertile and grow crops. Farm communities need farms with a diversity of livestock and crops to supply a growing demand for local food. Beef is also an important product because unlike most vegetables and fruit, it can be supplied year-round.

Ruminant animals can be used to improve marginal land. A truck driver called into a local food radio show (News 95.7 hosted by Richard Zurawski) commented that he was regularly driving transport trucks full of boxed beef from Alberta, past farms with alders growing up in the fields. He said “it’s just wrong! We could be growing our beef here.” Peter, Wilkins and Fink (2006) explore the role that meat and fat play in determining land resource requirements and agricultural carrying capacity. Focusing on New York state, Peters et al calculated the land needed to support 42 different diets ranging from low-fat lacto-vegetarian to high-fat meat-rich omnivorous. In general, they found that land requirements increased with meat consumption. However, because ruminants can make use of pasture and perennial crop land that wouldn’t be otherwise suitable for annual crops, they found that a diet containing a modest amount of meat and fat could sustain a larger number of people than a vegetarian diet with a more generous quantity of fat.

While we can use beef cattle to reclaim old farms and make use of marginal, hilly, or rocky land, it still requires a lot of skill to make a beef operation work. Raising animals on pasture requires more knowledge and skill than raising them in a feedlot. In order for grass-fed beef to be succulent and tender, the cattle need to forage on high-quality grasses and legumes, especially in the months prior to slaughter. Providing this nutritious and natural diet requires healthy soil and careful pasture management so that the plants are maintained at an optimal stage of growth.

To increase the percentage of locally-grown beef consumed by Nova Scotians, producers need to work together to develop a consistent, quality local beef product. When examining this issue in New Zealand, Parsons (2009:9) concluded that “the greatest barrier to a ... meat and wool industry transformation is the fierce culture of independence, poor communication and mistrust endemic in the industry. ... This behaviour is not because industry members are morally deficient, but rather symptomatic of the complex and dysfunctional supply chain structures they are in. In essence the system is flawed and the system determines the culture.” Cattle producers have been working hard to save their sector.

According to Dave Oulton, chairman of the Nova Scotia Cattle Producers, “almost every day, we get emails and calls from people who want to know where they can get local or regional, and safe, beef. We know the market is available.” (May 6 2009 press release).

According to John Tilley, new President of the Nova Scotia Cattle Producers, a number of players (including producers, extension staff, and researchers) have come together to test the advantages of grass-finishing cattle²¹⁹:

²¹⁹ Part of a letter submitted to *Atlantic Beef*, June 4, 2010.

*The Cape John Community Pasture is about to test this mysterious grass advantage. Over the next 3 or 4 years Cape John will be managed in a much more intensive way. The province is funding the initial year of a longer study that considers the benefits of grass, the benefits of improved pasture – right through to finishing. The central idea is that the industry needs, **producers need**, to put numbers around this grass advantage.*

Examination Of Costs And Revenues For Grass-Fed, Nova Scotia Beef

This case study of beef import replacement will be concluded with an examination of costs and revenues for grass-fed, Nova Scotia beef by John Duinusveld, Agriculture and Agri-Food Canada Nappan Research Station. He provided advice to producers on forage fed livestock and a cost/revenue projection per head for beef production. The scenarios are based on a 100% forage diet, although at this time, most local beef are fed some grain. Dr. Duinusveld's results are reproduced here with some modification as noted below.

Forage-fed beef animal's diet

Although the gains shown “do not rival those of a high grain diet, they are adequate to put sufficient back fat and marbling on a finishing animal to meet market demands. Assuming a 650 lb start weight, it will take about 280 days to finish a steer to 1300 lb live weight on a forage based system, if you can achieve consistently high gains. However, a grain based system takes about 190 days, or 1/3 less time.”

Dr. Duinusveld measured daily weight gain for steers on pasture for a number of years. His data shows that “if you want to finish beef on grass, your best results likely won't happen in your first couple of years. It takes time to learn how to keep the cattle eating as much high quality feed as possible, while still maintaining high quality pastures.” The challenge in a grass-fed beef production system is to produce “consistent, high quality forage and pasture that can be supplied to cattle on a year-round basis.” Dr. Duinusveld also recommends that forage-fed beef needs to be “young, with some fat cover to reduce shrinkage, and marbling for flavour. Quality and taste are important as producers consider moving to a forage-based system and as new customers get used to a ‘new’ product.”

Costs and revenues

Dr. Duinusveld assumes that feeders are brought in and raised for 320 days until slaughter. The table he provided does not include the fixed costs for a beef operation, such as farm and barn costs. Also, costs associated with transporting animals are not included. From this initial table (Table 58), different scenarios have been developed based on four different prices (carcass weight of 767 lb):

Table 58: \$1.60/lb, “considered a more normal price for beef” at the Truro Auction;
 Table 59: \$1.27/lb, closer to the current price (March 2010) at the Truro auction²²⁰;
 Table 60: \$1.42/lb, the price determined from Statistics Canada data for 2007; and
 Table 61: \$2.50/lb, the going price for selling beef directly to customers.

Table 58: Beef Production Cost and Revenue, \$1.60/lb

		barn silage	pasture grass	total	
days on feed		120	200	320	
feed cost/ton		135	50		
gain, lb per day		2.1	2.1		
					dress %
					58
	start wt dec 1	barn gain	pasture gain		carcass wt
wt lb	650	252	420	1322.00	766.76
feed eaten, tons		2.12	4.69		
feed cost		286.46	234.58	521.03	
yardage - bedding, labour, machinery		66	20	86.00	
interest-feed				15.99	
interest - animal				33.75	
animal cost				550.00	
total cost				1206.78	
revenue	at \$/lb	1.6		1226.82	
	carcass weight				
margin				\$20.04	

In this scenario (Table 58), producers are earning about \$20 per animal marketed.

Table 59: Beef Production Cost and Revenue, \$1.42/lb

		barn silage	pasture grass	total	
days on feed		120	200	320	
feed cost/ton		135	50		
gain, lb per day		2.1	2.1		
					dress %
					58
	start wt dec 1?	barn gain	pasture gain		carcass wt
wt lb	650	252	420	1322.00	766.76
feed eaten, tons		2.12	4.69		
feed cost		286.46	234.58	521.03	
yardage - bedding, labour, machinery		66	20	86.00	
interest-feed				15.99	
interest - animal				33.75	
animal cost				550.00	

²²⁰ Phillip Nunn, cattle producer, Brooklyn Hants County.

total cost			1206.78
revenue	at \$/lb	1.42	1088.80
	carcass weight		
margin			-\$117.98

Table 60: Beef Production Cost and Revenue, \$1.27/lb

		barn silage	pasture grass	total	
days on feed		120	200	320	
feed cost/ton		135	50		
gain, lb per day		2.1	2.1		dress %
					58
	start wt dec 1?	barn gain	pasture gain		carcass wt
wt lb	650	252	420	1322.00	766.76
feed eaten, tons		2.12	4.69		
feed cost		286.46	234.58	521.03	
yardage - bedding, labour, machinery		66	20	86.00	
interest-feed				15.99	
interest - animal				33.75	
animal cost				550.00	
total cost				1206.78	
revenue	at \$/lb	1.27		973.79	
	carcass weight				
margin				-\$232.99	

Table 61: Beef Production Cost and Revenue, \$2.50/lb

		barn silage	pasture grass	total	
days on feed		120	200	320	
feed cost/ton		135	50		
gain, lb per day		2.1	2.1		dress %
					58
	start wt dec 1?	barn gain	pasture gain		carcass wt
wt lb	650	252	420	1322.00	766.76
feed eaten, tons		2.12	4.69		
feed cost		286.46	234.58	521.03	
yardage - bedding, labour, machinery		66	20	86.00	
interest-feed				15.99	
interest - animal				33.75	
animal cost				550.00	
Cut, wrap, freezing, direct selling cost	.50/lb for cut and wrap + \$25/head			408.00	

total cost	for slaughter		1614.78
revenue	at \$/lb	2.5	1916.90
	carcass weight		
Margin/animal			\$302.12

In Tables 59 and 60, producers are losing \$118 and \$233 per animal at current prices, respectively. Table 61 shows a scenario where a producer gets the livestock slaughtered, cut, and wrapped, then sells sides or quarters directly to customers. This direct selling scenario requires more time and effort on marketing and customer relations, something not all farmers are willing to engage in. Customers are generally not used to buying beef this way, so the farmer has to spend time explaining to the customers how it works, arranging pick-up, and even in some cases, coaching customers on cooking methods for meat cuts they are not familiar with. The customer benefit is that they get beef for less than the grocery store price (on average), and they know how it is raised. Table 61 shows that the farmer can earn \$302 per animal, which is still low, considering the extra labour and marketing involved.

Sheep in Nova Scotia

Lamb (or sheep) production in Nova Scotia is an ecological way to produce two main products: meat, and wool. The third, hidden, product they produce, is excellent soil quality. Below is a discussion of some of the benefits of replacing imported lamb with locally-grown lamb, and some of the costs associated with lamb imports.

Highlights of this case-study

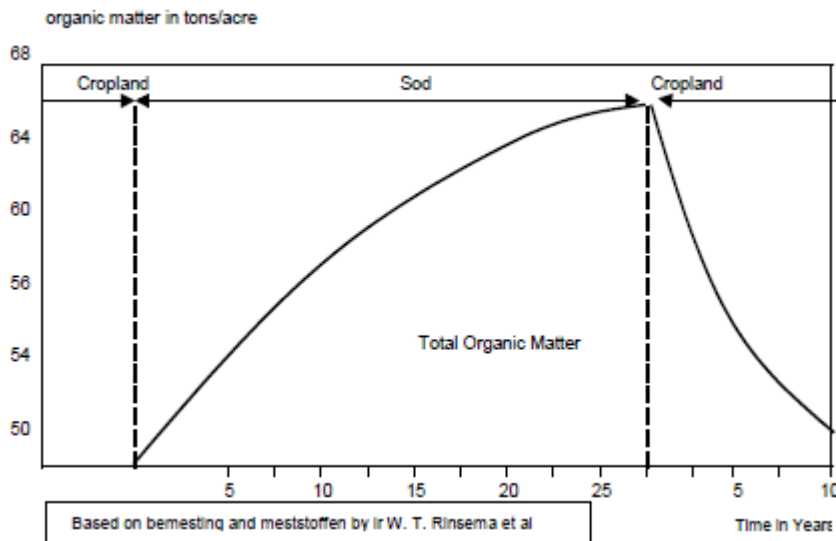
- ✓ **We produce 15 - 18% of the lamb we consume in Nova Scotia, and import the rest**
- ✓ **Sheep production has great potential for improving soil quality**
- ✓ **If we produced all the lamb we eat in this province**, farm cash receipts are estimated to increase from \$2 million to \$10.7 million/year and employment would increase from 40 full year equivalent jobs to 213 full year equivalent jobs.
- ✓ **On average, lamb imported to Nova Scotia creates 4.08 kg of CO₂e emissions per kg of lamb imported.**
- ✓ **Lamb meat is a healthy food:** lamb is fed primarily from grasses and clover, which makes the meat low in saturated fat, yet high in omega-3 fatty acids, beta carotene, vitamin E, folic acid and antioxidants.

Sheep Production Has Great Potential For Improving Soil Quality

Producing sheep improves soil quality over time because their diet is primarily composed of hay and pasture (also known as forages or sod crops). Forages cover the ground year-round and protect soil from erosion. Clover and other legumes in the forage mix naturally take nitrogen out of the air and put it in the soil, adding to soil fertility. The fibrous and extensive roots of forages also add considerably to soil organic carbon by taking carbon dioxide out of the air. Soil organic carbon is the material that makes soil spongy and ideal for growing plants. Organic carbon is the most important indicator of soil quality (see Figure 1). Pasture and hay can be grown in hilly areas that are too steep for row crop production (e.g. potatoes, other vegetables, and some grains). Also, sheep manure is returned to the soil to improve fertility. **Integrating ruminant livestock (such as sheep, cattle, and goats) with production of fruit, vegetables, and grains is the most economical way to maintain soil health and productivity over the long run on a farm.**

Figure 36 shows that growing hay and pasture improves soil organic carbon over time, while growing other crops can quickly deplete this critical resource.

Figure 36: Organic Carbon (or Organic Matter) in Soil from Forages (or Sod)²²¹
 (from Roxbury Farm, 2006)



Production of Lamb, Relative to Consumption

Lamb has become a popular meat to eat in Nova Scotia, and is especially favoured by people who come from the UK, Middle East, and Greece. Even though Nova Scotia has a favourable climate for growing the forages eaten by sheep, we are not producing all the sheep that we eat. In fact, we estimate that **we are only producing about 17% of what Nova Scotians eat**. This estimate is derived by dividing total production by total consumption of lamb.

Table 62 shows this production over consumption estimate for Nova Scotia between 2001 and 2007. Sheep producers agree with this estimate because we don't export very much out of the province. In Figure 37 we can see the large gap between the amount of lamb we consume, and the amount we produce. Currently, this is being filled by imported lamb.

Table 62: Nova Scotia Lamb Production Divided by Consumption, %, 2001-2007²²²

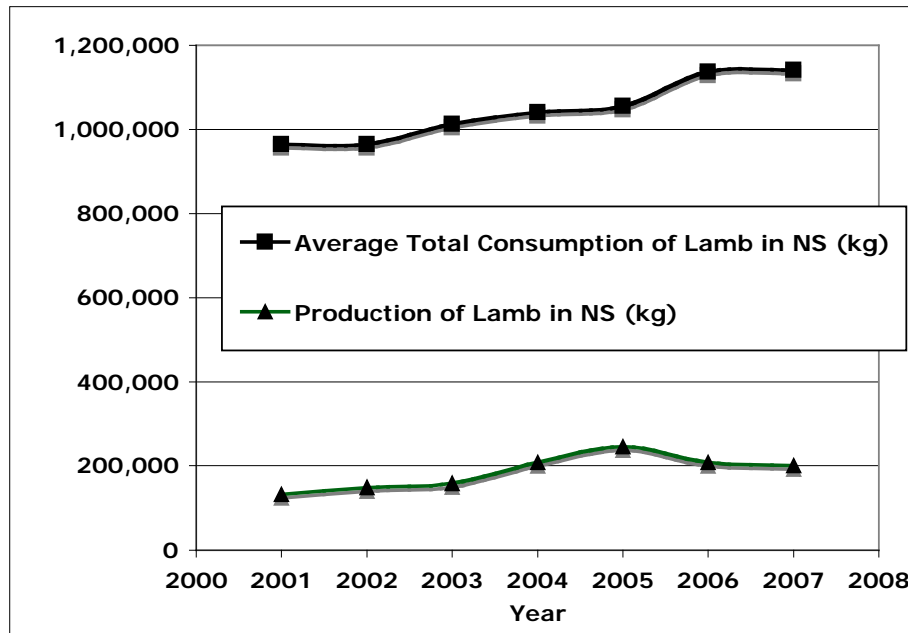
Year	Production/Consumption, %
2001	14%
2002	15%
2003	16%

²²¹ Roxbury Farm 2006

²²² Slaughter numbers are based on data from the Atlantic Provinces Weekly Livestock market report (Agriculture Canada). We have assumed a carcass weight of 21.09 kg or 46.5 pounds. Consumption numbers from Statistics Canada.

2004	20%
2005	23%
2006	18%
2007	17%

Figure 37: Nova Scotia Lamb Production and Consumption, %, 2001-2007



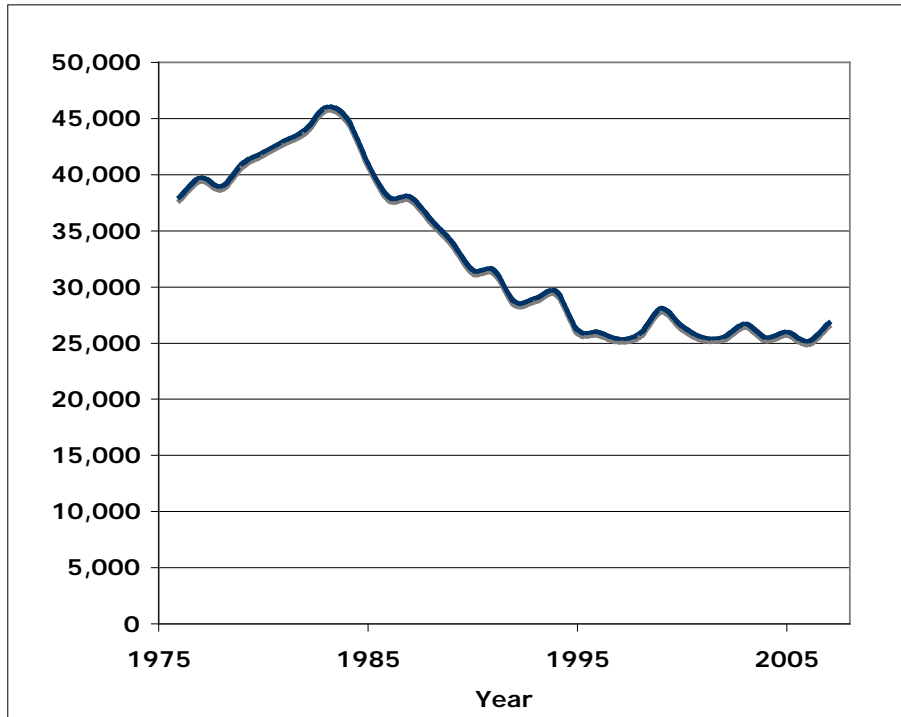
In Nova Scotia, lamb production has been in decline since about 1982 (see Figure 38). Estimates from sheep producers and processors match Statistics Canada estimates of about 10,000 animals slaughtered per year.²²³

We could be producing more lamb to fill the local market. In fact, this should be the goal – to match production to what we know Nova Scotians eat every year. Based on an estimate based on Canadian average statistics, we see in Figure 37 that there has been an increase in lamb consumption. A gradual increase in demand could serve as an incentive for producers to add sheep to their farms, and for the construction of more processing facilities throughout rural NS.

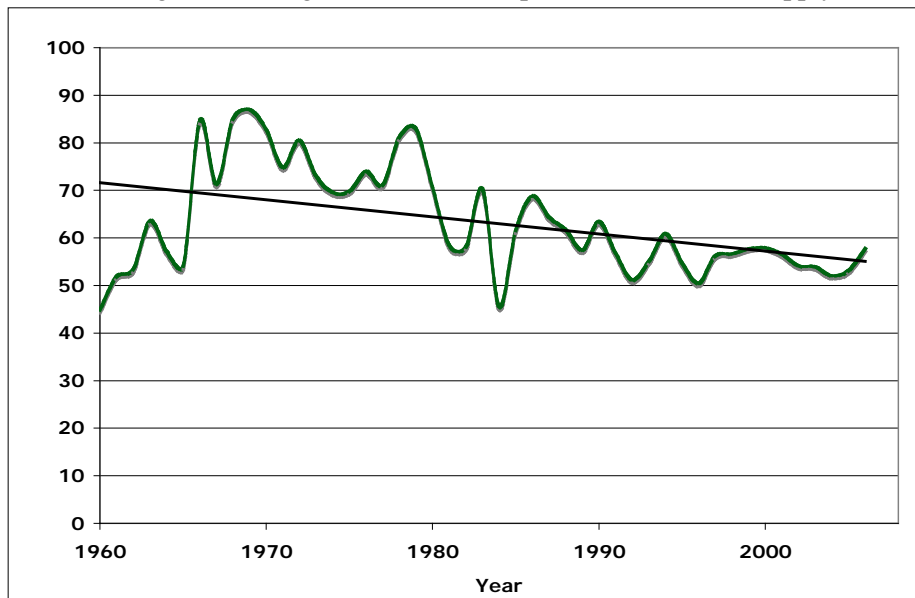
Figure 38: Total Sheep and Lambs, NS Farms, 1976-2007²²⁴

²²³ Farmers consulted included Graham Reid, Mike Eisnor and others.

²²⁴ Nova Scotia Department of Agriculture (and Marketing). 1988, 1993, 1997, 2007. Nova Scotia Agricultural Statistics.



In Canada as a whole, we see a reduction in lamb imports as a % of net supply. That means that over time, **Canadian farms are producing a greater share of what Canadians eat – a positive trend** (see Figure 39). Figure 39: Lamb Imports as a % of Net Supply, Canada, 1960-2006²²⁵

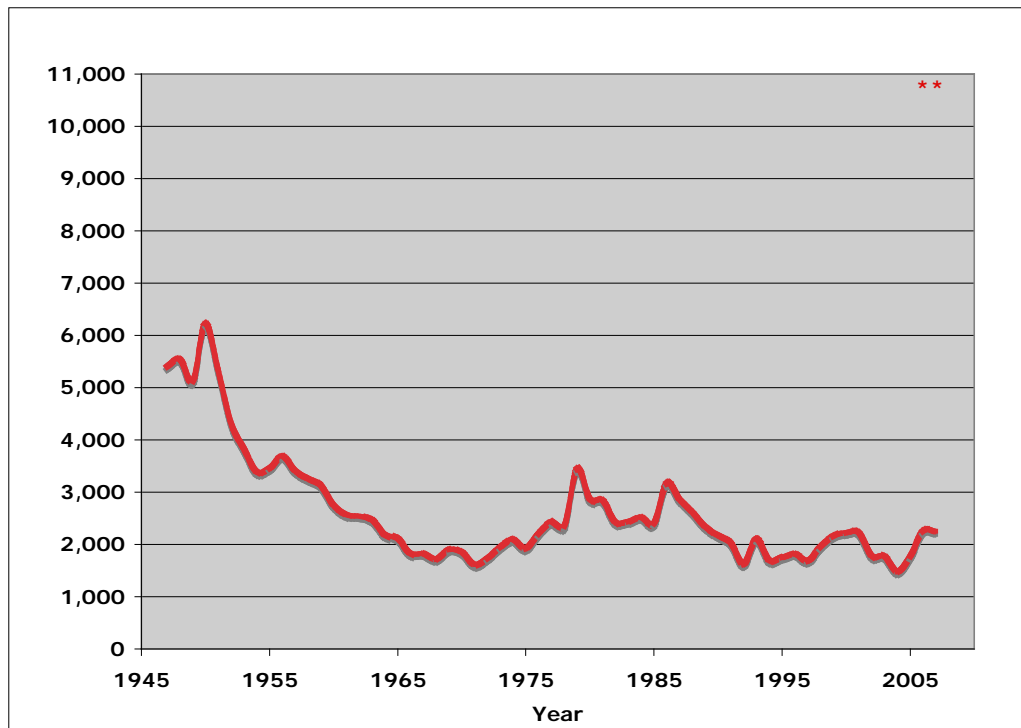


²²⁵ Net supply is total stocks (beginning stocks, plus production, plus imports) minus exports, waste, manufacturing. This was determined from tables in Statistics Canada. *Food Consumption in Canada*. Cat. No. 32-229.

Economic and Environmental Benefits of Replacing Imports with Local Product

In Nova Scotia farm cash receipts from the sale of sheep and lambs used to be much higher than they are now (Figure 40). Now it is approximately \$2 million/year. **If all imports of lamb were replaced by local production, it is estimated that farm cash receipts could increase by \$9 million to almost \$11 million.** Recent articles claim that production of lamb is promising because the price has been better in recent years.²²⁶ In 2009 it was 27% higher than in 2000.²²⁷

Figure 40: Farm Cash Receipts from the Sale of Sheep and Lambs, 1947 to 2008 (corrected for inflation and shown in 2007 dollars)²²⁸



Another benefit of replacing imports with local product is it would increase employment here. Presently it is estimated that local lamb production creates the equivalent of 40 full-time jobs. If we replaced all the imported lamb with local lamb, that would generate 213 jobs.

Some people would argue that it is good to have lamb meat imported from New Zealand because it is cheaper than local lamb. That may be true in some cases. But when we

²²⁶ RADOJKOVIC, J. 2010. Sheep farming gaining in popularity. Owen Sound Sun Times. January 15; Steele, E. and J. 2010. A great business if you have a solid plan. Canadian Farm Manager. June: 6.

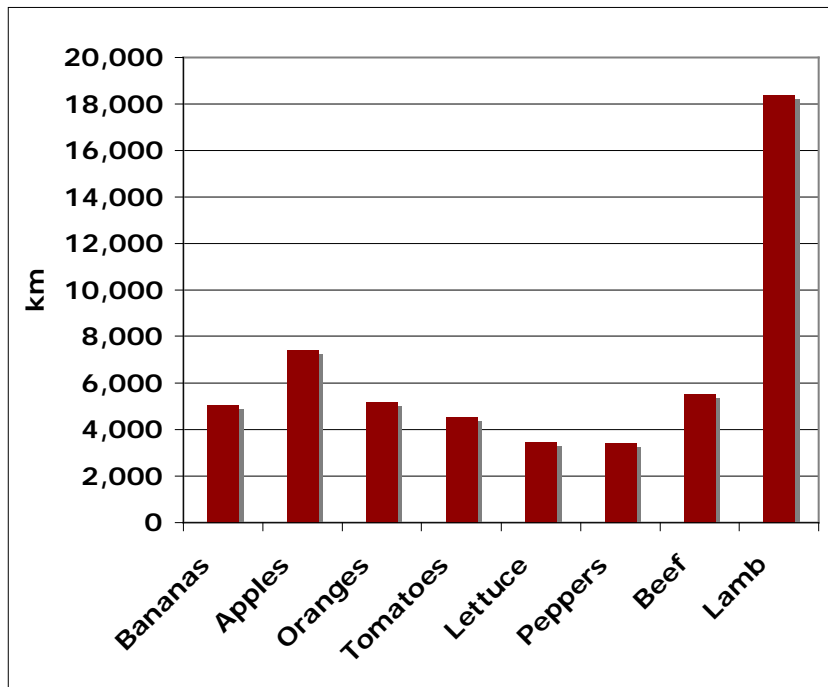
²²⁷ Canadian Sheep Federation 2008/09 Annual Review. Cansheep.ca

²²⁸ Statistics Canada 2008 Agriculture Economic Statistics, Farm Cash Receipts Cat No 21-011-XIE or CANSIM table 002-0001 and 002-0014, Latest update May 2008.

look at some of the real costs associated with those imports, the imported lamb may turn out to be more expensive.

Frozen lamb imports to Nova Scotia mainly come from New Zealand and Australia. These two countries produce massive amounts of lamb and are able to produce it for a lower price than we can because of the economies of scale and their climatic ability to have sheep grazing on pastures year-round (Saunders et al 2006). However, sheep from these countries has to be transported long distances, using fuel that is becoming more and more scarce. Figure 41 shows the weighted average distance lamb is transported (2007) and Figure 42 shows the associated greenhouse gas emissions associated with that transport.

Figure 41: Weighted Average Distance of Food Items Imported to Nova Scotia, 2007²²⁹



Since we can potentially produce all of the lamb we need for the present market, the fuel used to transport lamb from distant places is a waste of increasingly scarce resources. Also, greenhouse gas (GHG) emissions from burning this fuel are an unacceptable cost to society and will lead to additional costs due to climate change. We estimated the greenhouse gas (GHG) emissions associated with this unnecessary transport of lamb. In Table 63 we see that on average, lamb imported to NS was creating 4.08 kg of CO₂e emissions per kg of lamb imported.

²²⁹ See Distance Traveled and Emissions of a Food Basket for methods and calculations.

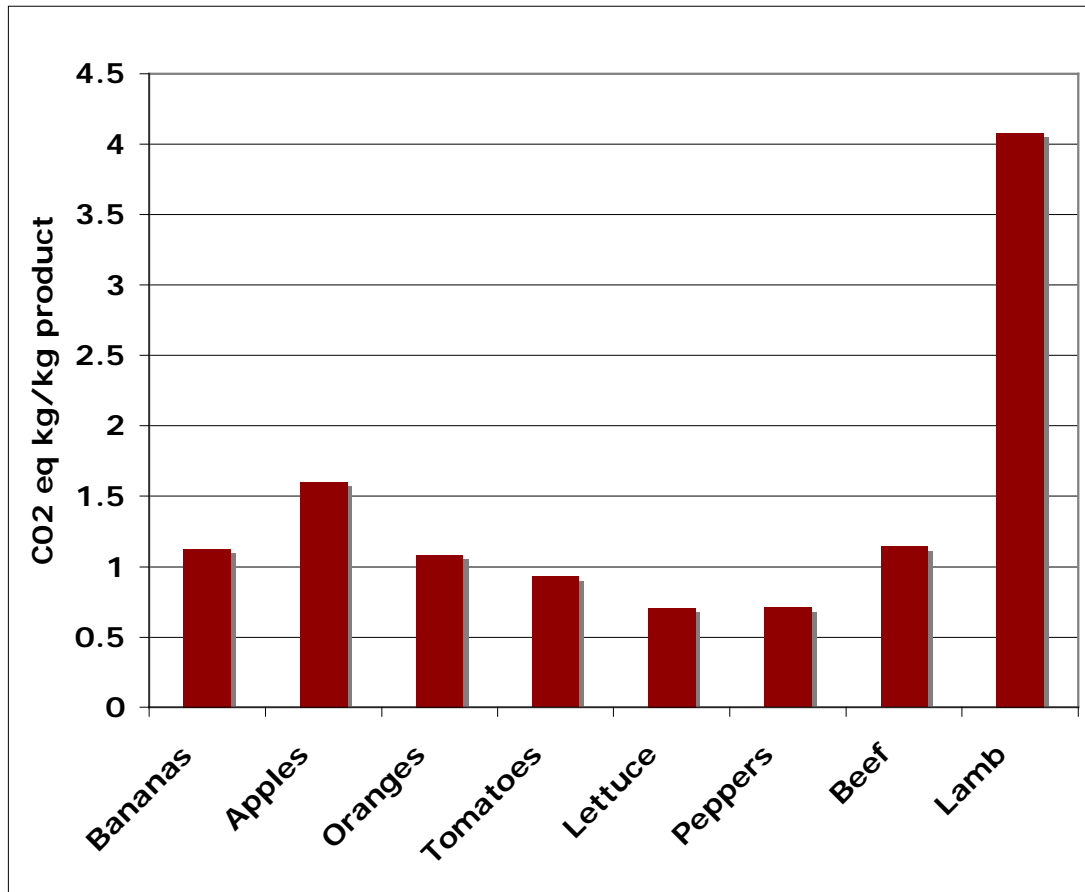
Table 63: Greenhouse Gas Emissions from the Transport of Lamb to Nova Scotia (kg of CO₂ per 1 kg of lamb shipped)

GHG Emissions	2003	2004	2005	2006	2007
Australia	2.87	0.94	2.23	1.65	3.17
New Zealand	1.16	2.83	1.56	0.43	0.90
United States (Iowa)	0.00	0.00	0.03	0.30	0.00
Namibia	0.00	0.00	0.00	0.03	0.00
Total	4.03	3.77	3.82	2.41	4.08

Lamb imported from other provinces (though likely to be minimal) has not been included.

Emissions of 4.08 kg of CO₂ equivalent per 1 kg of lamb imported is significantly higher relative to other imported food items (see Figure 42).

Figure 42: Weighted Greenhouse Gas Emissions Associated with the Transport of Imported Items²³⁰



²³⁰ See Distance Traveled and Emissions of a Food Basket for methods and calculations.

Conclusion

Replacing lamb imports with locally-produced lamb could produce significant economic, environmental, and social benefits.

- Farm cash receipts could increase from \$2 million to \$10.7 million/year.
- Employment could increase from 40 FYE (full year equivalent) jobs to 213 FYE jobs.
- Producing forage to feed lamb is an important part of an ecologically sound farming system.
- Reducing imports would reduce fuel consumption and reduce greenhouse gas emissions.
- Wool, replaces synthetic materials for clothing and blankets, and is a good material for insulation.
- Given that we need protein in our diet, lamb is one of the most ecological locally-grown sources.
- In moderation, grass-fed meat is important for our health.
 - Grass-fed meat is low in saturated fat, yet high in omega-3 fatty acids, beta carotene, vitamin E, folic acid and antioxidants. Conjugated linoleic acid (CLA), thought to reduce the risk of breast cancer and diabetes, also is higher in pastured meat.
 - Grass-fed livestock don't require regular administration of antibiotics to combat the spread of infection that is common in densely packed feedlots.
 - Grass-fed meat production practices do not typically include the injection of hormones to spur growth.
 - Grass-fed meat is much less likely to harbor acid-resistant E.coli. A natural diet of grass does not create the acidic environment where these bacteria are found.
- Sheep production provides an important food for many immigrants to Nova Scotia, as well as for Nova Scotians who have been here for generations.
- Raising lamb is an important part of a farm with children. They are small animals often used to teach youth about farming, responsibility, and economics.

Marketing Lamb

In 2003, Mike Isenor was interviewed for a GPI Atlantic report on Farm Viability. The following profile was included in Scott et al (2003). It is reproduced below in its entirety, with permission, to provide the reader with a sense of the history of the co-op, and also an excellent example of how producers got together, saw an opportunity, got critical support in key places, tested the market, and held on to it with determination and a commitment to quality standards.

Northumberland Co-op

Mike Isenor describes the birth and day to day operation of Northumberland. In the late 70s there was a fairly active community of sheep producers. They came from all over the

province to attend the sheep fair (a breeding stock sale). Of course, after a lot of people got into sheep,

suddenly the price dropped and it was difficult to get a consistently good price for lambs at the auctions.

Some weeks the price could be good, and the next week it could be devastating.

Producers got together to organize something where they could control their own market and prices. One of

the main driving forces behind it was Brewster Kneen. He was a great organizer and could get people enthusiastic about doing things that they thought they couldn't do. It was about 1980 when we initiated the Farmers' Market Project to see if there was a market for lamb meat in Halifax. We would get 30-35 lambs butchered and cut up and take them into the farmers' market on Saturday at 5 am. There were line-ups of people in the morning waiting to buy our lamb and we were always sold out. On the basis of that experiment, it was established that there was a demand for lamb and we should be able to organize a market for it.

Around the same time, Frank Sobey and the whole Sobey family were great lovers of lamb. Frank had just hired a new supervisor for all his meats departments from England, Ron Young. Frank took Ron in his big car and drove him around the farms in Pictou County. He used to say to Ron "why don't we have any fresh NS lamb in our stores? I want those lambs in my stores." The timing was superb. Ron was very supportive of us. He wanted us to succeed.

In the beginning the problem was having a year's supply. Traditionally people had their lambs in the late spring, and would go to market in late fall. No lambs were available from December until July. We had to work with the sheep producers to get a consistent year-round supply. This was the biggest challenge. As soon as we got started Ron Young gave us four of their biggest stores in Halifax. In the following weeks we'd get a few more lambs and we'd add a store until we were doing pretty well all their stores in the Halifax Metro area then Truro and New Glasgow. As soon as we had lambs available Ron would tell us where to send them.

Northumberland

- Attempt by co-op to generate better prices for producers
- Farmer's market is an incubator for new business, and test market
- Example of retailer support needed to get an initiative off the ground; retailer *wanted* the initiative to work (in the beginning)
- Purpose: to get as much money as possible and a steady, predictable price to the farmers for their lambs, not the lowest price to farmers
- Retailers later cut out direct sales to individual stores, preferring deliveries to a warehouse that supplies the region. This is problematic for meat coming from provincially inspected abattoirs which can only supply meat to stores within the province (regulations).
- Importance of having abattoir – bought it and formed another co-op.
- Customer loyalty – they wanted fresh lamb, locally produced.
- Diversity of markets and control over marketing is important.
- Have to increase the market just to remain the same size.
- Farms: small income; or do a combination of different things.
- Working together through Northumberland brings market stability.
- Co-op: a profit allocation goes back to farmers.

In 1982 we officially incorporated as a co-op, so we had our 20th anniversary last fall. All the farmers own the co-op. I'm the manager, but there's no owner. Members have equal say as to how the co-op is run. Directors are selected from the membership at our annual meetings, and they make the decisions with the manager. The idea, right from the beginning was to return as much money as possible to the farmers. Our objective was to maintain a steady price that producers could count on; that they could work toward. They knew what they were going to get paid if they had lambs ready in May, for example. That only worked when you took the profit motive away. It was also a big advantage that Sobey's was so supportive in the beginning because they wanted it to work too. There wasn't a hassle with them about prices.

In the beginning when we had too many lambs in the fall, Sobey's advertised them in their flyers, and they sold them for the price basically that we charged them. They were very supportive, and that got us on our feet. Once it was seen that we could actually supply the lambs and co-ordinate and deliver, we were up and running. Within a year or so we were delivering to all the Sobey's stores in Nova Scotia. Then we started to add other stores like Dominion and IGA, and independent stores and restaurants. For a long time, though, Sobey's was the major customer.

After Ron Young left the scene, Sobey's became a large corporation, and the idea of supporting Northumberland was lost. David Sobey basically stuck to us, even when some of the big supervisors were thinking of doing some things differently that were counter to our best interest. But eventually they wanted everything to come through their warehouses in Debert instead of direct sales to individual stores. And they wanted more processing – pre-cut lamb instead of whole carcasses, which we did, and then they wanted it put on trays for individual portions and delivered through the warehouse. Delivering directly to the warehouse is problematic for us because stores from all over the region would pull stock out of the warehouse, and because we are provincially inspected, we are only permitted to sell within the province.

After operating for about 4 years, Northumberland purchased the abattoir that we were getting our lambs killed in. So we formed a new co-op. The same members formed the Brookside Abattoir Co-op. At that time we felt we had really good quality, and reputation. When Sobey's started to go to other suppliers of lamb, customers left Sobey's for the lamb and went over to the stores that were still buying directly from us. We still sold the same number of lambs. But Sobey's share of our business was down to about 25% and Superstore was up to about 50 or 60% and the independents were somewhere in between. But now Superstore is demanding central warehousing, so we are in the same challenge.

A customer goes to a grocery store and looks at the lamb from New Zealand or Ontario and it's cut up and sealed in a tube package, it doesn't look appealing. They want fresh lamb from Nova Scotia that's been delivered the day before. The local lamb is far superior to imported lamb. In other parts of the world, New Zealand lamb is thought to be the best lamb, but not here. It's the flavour and the tenderness and the freshness.

Restaurants and a couple of little independent stores make up about 40% of our sales at this time. Sobeys would make up about 35% right now, and Superstore makes up 25%. Over the last few years we've been building on restaurants. We had to be in charge of marketing our own lambs, because if you leave it to someone else they're not looking after your interest. They could switch to another supplier at any time. If that happens we're back to where we started and the sheep industry wouldn't stand a chance in the province. It wouldn't exist. By being our own marketers, and by diversifying, we become more insulated from a store deciding that they're not going to buy from us. We've been vulnerable to that and we're lucky that we have not been wiped out. If they change supervisors and then say 'lets try this' then -- bingo -- we could be wiped out. If you're selling 90% of your product to one place and all of a sudden you're cut off and your supply is ready to go, what are you going to do? You're always having to try to increase the market in order to stay the same, it shifts around so much.

Growers

We have about 100 shippers (producers of lamb) on our list, people that have sold to us in the last few years. We're usually able to accommodate most people who have lambs, or raise the kind of lambs we're looking for. As a co-op, market standards are set based on what we need. We try to let our producers know what our customers are asking for. We pay according to production that most closely fits the majority of our market demand. We try to hit the premium price for the lambs in highest demand, or lambs with the best return.

Some of our biggest producers would have 4 or 5 hundred ewes, producing 6 to 7 hundred lambs a year, down to people with 10-15 sheep selling you 20 lambs a year. The average would be people selling you about 60 – 70 lambs a year. These would be people where sheep farming is not their main income. Sheep farming is not something you'll get rich at. I don't really believe that the way things are now that you can be viable strictly on sheep farming. Even with 500 ewes. There are paper scenarios that show it can be done, and theoretically it can. But everything has to go right. I see it more as something people can do to enable them to stay where they are, and make a living along with something else. It has to be something they really like to do. There are a few people with large numbers doing it. But its pretty darn hard, and you'd have to live on a pretty small income I would think.

Centralization and amalgamation vs. a distinct product

Most of the farming here is in competition with world prices. If you can't produce enough to put tractor-trailer loads of this product in the warehouses to distribute to all the stores, you can't sell any. Unless you go to a farmers' market or an independent store. The only way to be viable in the food industry is to be centralized with a huge market and all the raw materials at the most economical advantage. You have to have the cheapest inputs. Our inputs aren't the cheapest (in Nova Scotia). We don't have enough market. There's not enough demand for the products to ever get big enough. Northumberland survives because NS lamb is perceived as a distinct product by our customers. You can't replace it with Ontario lamb or NZ lamb. New Zealand prices are very low. If we were

trying to sell at those prices, then all the farmers would quit raising lambs. For instance New Zealand legs of lamb often sell for \$2.99/lb and ours sell for \$4.99/lb in the stores.

Since Northumberland has operated, people have received on average, a way better price than they would have without Northumberland. For a number of sheep producers operating independently, it's really tricky to balance your supply with the demand. Working together through Northumberland brings stability. At this point, there are the same number, or perhaps fewer farms raising sheep, but in the past lambs were raised up as feeders and shipped out of the province to be finished in other places, like Ontario. Now a lot more of the lambs are finished in the province.

People who buy lamb are willing to pay more money for their meat because it's something they like. Probably the majority of lamb is bought by people from other areas of the world who ate lamb prior to coming to Canada. People who are used to eating lamb can't get used to eating watery chicken.

In 2002, 5,000 lambs went through Northumberland. Although the price varies a bit, if we get \$3.65/lb from the store, the farmer gets about \$2.95. We need 65 to 70 cents a pound to operate Northumberland. One of the reasons why lamb has not really competed very well with other meats is that it's not very economical to process because of the small size. It's a lot more expensive to process one lamb than it is to process a cow, per pound.

The current challenge is, in the last few months, reduced sales compared to last year. Superstore decided to switch to lamb pre-cut, store it in a warehouse, and bring it in from a federal plant. They were 50-60% of our market before doing that, and now they're down to about 30%. We still sell to some of the stores because they put up a fuss that they needed our lamb for certain customers. The other supplier is out there to make a profit; their reason for being is not for the welfare of the sheep farmer, and the price to the sheep farmer will fall. That's the difference. If Northumberland makes a profit it's returned to the farmers. If we do make extra money we have a profit allocation that is paid back to all the farmers in accordance with how many lambs they produce. So there's no incentive for Northumberland to make a profit for themselves, and that's what makes us unique.

If, in the future, all meat has to be federally inspected we'd be in big trouble because there is only one federal plant in the Maritimes that will kill lambs. To be a federal plant you have to be a pretty big size, a lot bigger than we are. You have to have a lot more than lamb, and generally a Federal plant finds they are not doing enough lamb to justify the cost of keeping a line open for it so, they don't want to bother with lamb.

Conclusion: How do we create a more locally-based food system?

The concept of a 'food mile' has captured the attention of the general public and the media, raising the profile of local agricultural issues. Our ultimate goal is to have tasty nutritious food to eat, reasonable prices for both consumers and producers, wealth generation in rural Nova Scotia, minimal environmental impact, good relationships, and self-reliance.

The purpose of this report is to inform ourselves about the costs and benefits of our food system, and estimate changes that would happen if we increased the portion of local food in our diet. Once we are more informed, how do we act on this information? Assuming that we understand the benefits of a more local food system, recommendations for achieving it are discussed below.

The main theme that emerges from this report is about making prices more 'real'. For instance, the price of food should reflect the real cost of producing it. The supply managed dairy and poultry sectors, although not perfect, have helped to put dairy and poultry products on store shelves at a price that reflects the cost of production. They have also managed, to a certain extent, to match supply with demand. That should at least be a *goal* with the other agricultural sectors. In the case of products that can be grown here, assess supply, assess demand, and see what can be done to match the two.

The real cost of producing food should include fair wages for farmers and their workers as well as the ability to steward the land. People and the land should not be 'used up' in the process of growing food. The local Fair Trade initiative in Wolfville touches on this desire to be fair and non-exploitive. This could be a start to a much more comprehensive move to fair prices for local farmers. If we can do it with Fair Trade coffee and chocolate, we can do it with food produced here too.

Another price that is not real is the price of transportation, particularly road transportation. Freight transport, through taxes and fees, pays only a small portion of the real cost of building and maintaining the highway network in Nova Scotia (and across North America). If freight companies were paying the full cost of their wear and tear on roads, as well as the greenhouse gases, pollution, accidents, and congestion they cause, food imported by truck would go up in price. If we add the full cost of the fuel they use, the full cost of imported food would go up even more. Locally-produced food would be much more attractive and necessary. Switzerland has a system of charging freight trucks according to their emissions and road use. Because we are not charging these real transportation costs, our system is skewed to support products from anywhere in the world that can produce food for less. Producing food for less can sometimes be a function of efficiencies of scale, but it can also mean reducing costs at the expense of people and the environment.

Subsidies also skew prices so they are not real. Nova Scotia does not subsidize our farmers as much as, for example, Quebec subsidizes their farmers. As a result our farmers cannot compete with the prices Quebec farmers can charge. Similarly, US farmers are subsidized more than Canadian farmers are. Also, there are different regulations and standards throughout the world. In some places, stronger pesticides can be used, and lower wages are paid. Or in California, water for farming is subsidized. As long as we have these uneven subsidies and standards, along with transportation that is too cheap relative to its cost, our farmers will more often than not lose out. We either have to 'even the playing field' or we need to charge a lot more for transportation.

Another subsidy that many consumers are not aware of is an internal farm subsidy. Farmers often take jobs off the farm in order to pay for the farming operation. Or they are not paying themselves or their offspring for their labour. Good farming should be rewarded in the marketplace in the same way as good carpentry or good teaching.

Another price that is not real is the price for unhealthy processed food. This is beginning to be recognized as schools remove unhealthy foods from vending machines and cafeterias. The hospitals are starting to do the same. Health care providers understand that an unhealthy population is very expensive to care for, and now are starting to 'invest' in healthy food. This is a very positive trend. European countries such as Denmark are mandating that all government-funded institutions such as day cares, schools etc have organic food, mostly local. The two reasons for this are that it is good for rural economies, and it helps the population stay healthier, which saves them money. Unhealthy processed food causes increased health care costs down the road, and it is the most expensive food in terms of net energy intensity. Therefore, it should be much more expensive. There is a parallel with smoking. Addiction to sugar can be tackled the same way addiction to nicotine was addressed. By adding taxes, isolating smokers, and educating youth, fewer people smoke today. It is not as socially acceptable as it used to be.

Recognition of the health benefits of regular CSA deliveries of vegetables and fruits has come in the form of health insurance companies paying rebates for subscriptions in Madison, Wisconsin. Those who benefit from good diet are helping to pay for it.

When a good diet creates a positive outcome that is a positive externality. In a place with public health care, like Canada, this kind of positive externality benefits everyone. When trucking causes increased maintenance costs on highways, and trucks aren't charged for it, that is a negative externality. Pollution, greenhouse gases, and ill-health from a bad diet are all examples of negative externalities. There is little incentive to be efficient, or eat well, if we don't have to pay for the damage, the health care, or the climate chaos. If, somehow, we can internalize the externalities, both positive and negative, we will make much better decisions, and everyone will benefit more. When Swiss trucks are charged according to use and vehicle efficiency, that is internalizing a negative externality. When Madison CSA customers are given a rebate for eating fresh vegetables and fruits, that is internalizing a positive externality. These are the kinds of incentives that will maximize benefits for everyone.

Recommendations

For Consumers

- Vote with your dollar. Support farmers' markets, farm markets, community supported agriculture (CSA) operations, buying clubs, and retailers and restaurants who support local farmers.
- Ask questions at the grocery store, restaurants, and institutions. Find out where they purchase their food and ask them to improve their labeling.
- Join or donate to one of the many organizations working on food issues in Nova Scotia and get active! For a listing of organizations, visit <http://www.nsfoodsecurity.org/>.
- Reduce the consumption of junk food and other foods of low nutritional value;
- Use low-energy alternative food storage and preservation methods, such as canning, dehydrating, lactofermentation, and root cellars;
- Reduce your food waste. Approximately one quarter of all food sold is wasted;
- Shift diets to correspond to food available locally in season.

For Farmers

- Farmers need to work together more, figure out what they want from government and ask for it;
- Forge new, unconventional, and powerful alliances. There are linkages forming between health, environmental, social justice, and anti-poverty organizations. There are allies in arts and culture organizations, schools, restaurants, gardening groups, faith groups, immigrant organizations and more.

For Food and Farming Organizations

- Keep momentum of present enthusiasm:
 - Forge new, unconventional, and powerful alliances;
 - Teach people how to cook, preserve, store, eat seasonally;
 - Emphasize fun, social aspect of local food. Keep it positive!
 - Set very public targets with allies. Make a plan. Include incentives. Measure progress!
 - Challenge grocery stores to compete regarding the percentage of local food offered
- Organize customer groups to buy directly from farmers. For example, direct beef orders through workplaces. Combine cooking and preserve-making classes with visits to farms to buy produce.
- Follow the examples set by organizations like the Madison Area Community Supported Agriculture Coalition (MACSAC) and organize events to promote CSAs, lobby for rebates from the Department of Health for CSA subscription rebates, and encourage those who can to donate funds to help lower income families get CSA subscriptions.

- Use existing programs to further a healthy local food system and increase sphere of influence. Open farm days, 4-H, Harvest Festivals and picnics, exhibitions, and community college programs all offer possibilities for connection.

For the Private Sector

- Be transparent in the labeling of food products. It is often very difficult to figure out where food items are coming from in a retail setting. Signage is often ambiguous or non-existent. Staff are not always well-informed as to the origins of particular food items.
- Conduct an audit of the food you currently purchase. Create a local, sustainable food procurement policy, with minimum targets that increase over time.
- Seek to replace imported food items that are easily grown in NS with products from our own farms.
- Greater transparency with regard to what is being sold in the grocery stores is needed. The Canadian Council of Grocery Distributors should compile and publish what percentage of food is grown or produced in Atlantic Canada. These results should be available by food group (e.g. fruit, vegetables, dairy, meat). It is also important that the report display goods produced in Atlantic Canada separately from goods processed in Atlantic Canada to display an accurate assessment of the food system.
- Reintroduce options for producers to sell directly to grocery stores. The centralized distribution systems that have developed over the last few years have made it increasingly difficult for smaller producers to supply the larger supermarkets. There is some indication that this is changing²³¹.
- Reduce food waste. Approximately one quarter of all food is wasted.
- Use low-energy alternative food storage and preservation methods.
- Invest in the local food movement, for example, through Slow Money.

For Government and Institutions

Procurement

- Develop and adopt local, sustainable procurement policies. Policies should include targets, with plans to increase the targets over time. Additionally, policy makers should carefully consider their definition of local, sustainable food, and extend the definition beyond basic geography to include sustainable production methods, social justice, and corporate responsibility.
- Implementation of local, sustainable procurement policies also has its challenges. Consider the following recommendations to overcome common barriers:
 - **Money.** Incentives to buy local food need to be created and money for food needs to be seen as an investment in Nova Scotia agriculture. Schools and hospitals have very limited food budgets. Schools, hospitals

²³¹ Beating the odds - Local producer suppliers being welcomed back (2009, June 3) *CBC commentary, Donald Daigle, a vegetable producer in Acadieville, New Brunswick and chair of the Canadian Farm Business Management Council.*

and other institutions have or will lose a revenue stream due to the loss of pouring contracts from soft drink companies as unhealthy foods are replaced. Additionally, some schools have experienced a decrease in sales due to a lack of uptake on healthier foods.

- **Staffing.** Funding for additional staff and staff training is needed. This is tied to the issue above. More staff are needed to prepare food items from scratch than were needed to reheat and serve pre-prepared meals.
- **Facilities.** Ensure institutions have proper kitchen facilities and equipment. For example, many schools were not built with kitchens, thus meal preparation options are very limited.
- **Invest in a matchmaker position.** The current food service model is heavily reliant on a small number of large suppliers. It takes additional time and resources to for food service managers and farmers/small local suppliers to find one another. Additionally, some principals are now finding themselves in the position of running school cafeterias (as food service companies pull out). This becomes one more item added to their job description and principals may or may not have experience in running a cafeteria. A matchmaker would assist in connecting producers and food service managers.
- **Amend prohibitive policies.** According to Health Canada and the Food Safety Division of the Provincial Department of Agriculture, there is no legislation preventing institutions from buying provincially inspected meat products. Yet, it seems that some food service companies are required to use federally inspected products. This appears to be an internal policy. The policy of using only federally inspected meat limits the market for provincially inspected meat to restaurants and direct markets. (The grocery stores cannot buy provincially inspected meat either, as their distribution channels require food products to cross provincial boundaries.)
- **Foster an environment that supports a change in eating habits.** Elementary students have adapted more quickly to the healthy foods in their schools. The high school students are less receptive. Capital Health has expressed concern that people won't buy the healthier food options. Once the elementary students who are used to healthy food reach high school, it is more likely they will be more receptive to new, healthy cafeteria offerings.
- **Reduce waste.** Food waste represents approximately a quarter of all food sold. By reducing food waste, institutions can save money – money that could be used to pay farmers a fairer price.
- **Promote friendly competition!** Some Nova Scotia universities are tracking their local purchasing. If other universities, health care facilities and schools got on board, there could be a buy local competition.

Research & Data Collection

In order to gain a more complete understanding of the Nova Scotia food system, to set targets and to measure progress, good data is needed. Below are our recommendations of data that should be captured and targets that should be set:

- **Data on food trade, particularly interprovincial trade.** While there is information from Industry Canada, via the Strategis online database, about food products coming into the country, there is a lack of data about food moving between provincial borders.
- **Nova Scotia production data.** Because of the small number of producers here and because of privacy legislation, Nova Scotia production data is often either unavailable or available only as Maritime or Atlantic/Quebec data. Is there a way to respect privacy concerns, but also make sure that important data can be accessed for smaller markets, like those in NS and other Atlantic provinces?
- **Data on trucking/shipping routes.** Distance calculations were based on the assumption that food was moving via direct routes. However, it is likely that these routes are not direct, but rather that food is being consolidated at particular points in the journey. These exact routes are unknown.
- **Set targets similar to those set in Maine.** Nova Scotia should measure and set a target for the share of the food eaten that is produced within the province. Maine has set a target of 80% by 2020, which could also be adopted by Nova Scotia. Nova Scotia should also measure and set a target for the share of the food dollar spent in the province that goes back to farms. Increasing the share by 2-3% per year would be a good start.
- **Study the impact that import replacement can have on local employment.** Agriculture has great potential for job creation, especially in rural areas. Invest in import replacement to create jobs.

Invest in Innovative Ideas

Money spent on local agricultural programs needs to be seen as an investment in our economy, our social fabric, our health, and our environment. In our research, we have come across innovative programs in other regions that could be implemented here, if there was financial support to do so. Here are some examples:

- **Watershed Agricultural Council** —This organization in New York State directs funds that would have been used to build water treatment facilities into supporting small farms and woodlot businesses. Their research shows that small farms and woodlots, if given funds to protect streams and wetlands, will protect the watershed more effectively than other land uses. The Council promotes the consumption of locally-produced food and wood products, and helps consumers connect the quality of their water with their support of watershed land stewards' businesses.
- **Matchmakers** – Individuals who link farmers with institutions, such as schools or universities. We met one such matchmaker in Massachusetts, Kelly Erwin, who describes herself as a 'dating service' for farmers and food service managers. She understands the needs and challenges faced by each party. She has a directory of farmers, knows what each grows and in approximately what quantity, and helps them find schools and universities on their existing delivery routes. She develops

resources for food service managers, such as local food cookbooks and seasonal availability charts. Five years into this initiative, she hopes that this job will become a permanent part of the Department of Agriculture.

- **Support for CSAs** – A Community Supported Agriculture (CSA) system is one in which a farm sells “shares” at the beginning of the season. Their customers receive a weekly basket of fresh farm products. In Nova Scotia we have about a dozen CSAs – Maine has over 100! In fact, the Maine Organic Farmers and Gardeners Association (MOFGA) has a staff person devoted to CSAs, providing resources and support for farmers interested in this marketing approach. Similarly MACSAC in Wisconsin has successfully made CSAs part of the mainstream. Their ideas about subsidizing CSA shares are worth adopting here.
- **Support for new farmers** – Who is going to grow all the food we are now so interested in eating? An apprentice/journeyman program for new farmers put on by MOFGA is attracting interest and teaching valuable skills to up and coming farmers. Also, the Intervale in Vermont allows new farmers to gain experience and use common land and equipment without a huge investment. Once they’ve proven their ideas work, they move on to create their own farms.

And there are some home-grown programs that should be continued

- **Direct Marketing Community Development Trust Fund.** This is a Nova Scotia fund administered by the Department of Agriculture. It is definitely needed, but currently over-subscribed. The monies for the fund should be increased.
- **Select Nova Scotia.**
- Infrastructure and support for new farmers’ markets. Establish economic development programs for farmers’ markets through market managers, promotional materials and producer co-ops.

Remove Policy Barriers

- Break down barriers related to provincial and federal meat inspection. Develop regulations and policies that promote, rather than discourage, the sale of provincially-inspected meat. Provincially inspected meat cannot cross provincial borders. This excludes provincially inspected meat from being sold in the grocery stores, as the distribution networks are set up on a Maritime basis. Certain institutions have policies that only allow them to purchase federally-inspected meat.
- Match food safety regulations to the scale of operations. Current regulations are prohibitive to smaller processors. We need diverse and decentralized food processing operations

Land Use

- Give priority to sustainable land use over non-sustainable land use when making development decisions

- Develop Working Land Conservation easements to protect farmland
- Ensure that activities in rural areas protect watersheds
- Preventative value of farm and farmland investments now

Municipal Governments

Traditionally municipal governments have not been involved in food systems, but there is growing interest and potential for municipalities to promote sustainable food systems

- Support farmers' markets.
- Support farmland conservation with municipal zoning
- Include food sovereignty in municipal plans, such as Integrated Community Sustainability Plans (ICSP)

National Food Policy

Across the country, citizens in each province are facing similar challenges in creating more sustainable, locally-based food systems. There is currently no national food policy, though both the NDP and Liberal parties have conducted consultations and the Liberals have developed one.

- We recommend that the government develop a federal food policy that is based on the principles of food sovereignty.

Full Cost Accounting

Move toward a system that internalizes the costs of a globalized food system and also pays farmers for the benefits of sustainable agriculture.

- Transportation taxes. Charge transport trucks (as part of tolls or license fees) according to their estimated damages to highways. If freight transport trucks were charged the full cost for their use of the highways (public infrastructure) at the toll booth when they enter the province, they would pass that cost on to the shipper, and the cost would be integrated into the price of imported food.
- True cost of food should be reflected in the price of food paid to the producer

Final Reflections

There has been an incredible shift in awareness of the importance of local food over the past three years. This shift has taken place not only in Nova Scotia, but across Canada and the United States. When we visited New England in early 2008, many of the people we spoke with commented on the large scale shift in awareness that was taking place. It seemed that a tipping point had been reached.

When we began the Food Miles Project in 2007, our initial outreach ideas focused on how to raise awareness about the importance of local food. And while that is still important, we rapidly realized that many people were already supportive of local food systems and wanted to take action.

Meanwhile, it has become increasingly clear that the food system in Nova Scotia is in crisis. Amid the heart-breaking stories and the depressing graphs, there is a fierce passion for local food. And in the midst of crisis, there are those who see opportunity. In

the last three years, we have met so many incredible, inspirational, innovative, dedicated, hard-working people. It is our hope that the groundswell of support for local agriculture will result in concrete solutions for our food system before it is too late.

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Glossary

CO₂ equivalent

Carbon dioxide equivalent is a measure used to compare the emissions from various greenhouse gases based upon their global warming potential. For example, the global warming potential for methane over 100 years is 21. This means that emissions of one million metric tons of methane is equivalent to emissions of 21 million metric tons of carbon dioxide²³².

Community Support Agriculture (CSA)

Community Support Agriculture is a food distribution system whereby farmers sell “shares” of the harvest to a set number of consumers at the beginning of the farming season. Consumers then receive a regular, generally weekly, box of food from the farm.

Food Sovereignty

The Six Pillars of Food Sovereignty were developed at [Nyéléni](#) in 2007 (the International Forum For Food Sovereignty in Mali, West Africa). The pillars are as follows:

1. Focuses on food for people;
2. Values food providers;
3. Localises food systems;
4. Puts control locally;
5. Builds knowledge and skills;
6. Works with nature²³³.

Hazard Analysis and Critical Control Points (HACCP)

HACCP is a systematic preventive approach to food safety designed to identify hazards (physical, chemical, biological), so that key actions, or Critical Control Points can be taken to reduce or eliminate the risks. There are seven HACCP principles to which facilities must adhere in order to achieve recognition²³⁴.

Multiplier: This is the number used to multiply a dollar amount in order to develop an estimate of economic impacts beyond the original expenditure. It can also be used with respect to income and employment.

Net Farm Income: Defined as total cash receipts minus operating expenses after rebates plus income in kind minus depreciation charges plus value of inventory change. (Statistics Canada. 2003. *Agriculture Economic Statistics*. Cat. No. 21-010-XIE.)

Person Years of Employment (PYE): Total annual hours worked, divided by 2000 hours/year (40 hours multiplied by 50 weeks).

²³² Direct quote from: OECD Glossary of Statistical Terms (2005). Retrieved July 3, 2010 from <http://stats.oecd.org/glossary/detail.asp?ID=285>

²³³ From: <http://peoplesfoodpolicy.ca/foodsovereignty>

²³⁴ For details on recognition of an establishment’s HACCP system in Canada, visit: <http://www.inspection.gc.ca/english/fssa/polstrat/haccp/manue/ch3e.shtml>

Supply Management

Supply management is a marketing system whereby production and allocation of quotas from certain commodities are regulated by provincial marketing boards. In Canada, dairy, eggs, and poultry are supply managed.