Montreal Economic Institute
Ideas for a More Prosperous Nation

ECONOMIC NOTE
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Will Buying Food Locally Save the Planet?

The movement promoting the purchase of locally produced food has grown in influence in recent years, in Quebec as in the rest of the world. Beyond the traditional economic arguments based on a protectionist approach, it is the environmental aspect which seems nowadays to motivate the support of groups and citizens in favour of reducing "food miles." It is argued that by discouraging consumers from buying food transported from distant locations, less energy – and ultimately less greenhouse gas – is being expanded, thus contributing to the fight against environmental degradation.

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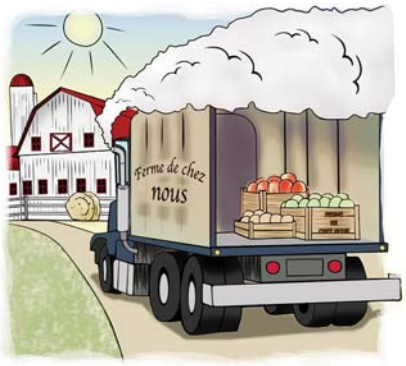
The appeal of the food-miles perspective, with its promise to reconnect people with food, neighbouring producers and seasonality, while delivering environmental, economic, health and social benefits, is understandable. Many legitimate reasons can motivate consumers to personally choose to buy food locally, for example if they believe local food to be of higher quality. However, the expected environmental advantages of buying food locally are often based on an improper assessment of the overall sources of greenhouse gas emissions in the food production and distribution process, as well as a misunderstanding of the advantages of geographic specialization.



From subsistence to commercial agriculture

The distinction between subsistence agriculture and commercial agriculture is fundamental to any discussion of food production. In subsistence agriculture, food is consumed in the community in which it is produced. Crop products are stored at the end of the growing season and drawn down until the next harvest, while domesticated livestock provide some variety in the diet and serve as a form of insurance against crop failure.

Because of bad weather, plant diseases, pest infestations, and their inability to draw on the surplus food generated in other agricultural regions, individuals living in subsistence agricultural production systems were, and still are, subjected to recurring famines and starvation. This situation only began to change on a significant scale in Western Europe in the late 18th century with the development of the mass transport of foodstuffs and large-scale storage facilities.

Commercial agriculture, on the other hand, implies reliance on trade with producers in more remote locations. Rising productivity and advancing specialization leave people free to develop expertise in other fields.

Agricultural producers in advanced economies now generally specialize in a few crops or in one type of livestock. While small in numbers, they often generate enough surpluses to enter international trade because of the high productivity made possible by modern technologies. Along with exports from other lines of business, they create the capacity to import products - including foodstuffs - which are produced more efficiently in other locations. This exchange contributes to a higher standard of living for all the involved parties than would otherwise be the case.

TABLE 1

Food Life Cycle

Scope	Player	Input
1. Raw material for production	Farm	Seed, land, fertilizer, water, herbicide, pesticide, etc.
2. Production		Capital (machinery, facility buildings, etc.) Energy (fuel, electricity, oil) Labour
3. Packaging		
4. Distribution	Supply chain	Storage Waste Transportation Labour
5. Consumption	Consumer	Transportation Preparation Waste
6. Disposal		Recycle Waste Transportation

Greenhouse gas emissions from food transportation

The most problematic aspect of the food-miles perspective is that it ignores productivity differentials between geographical locations. In other words, activists assume that producing a given food item requires the same amount of inputs independently of where and how it is produced. In this context, the distance traveled between producers and the stores where food is being bought, along with the mode of transportation used, become the only determinants of a food's environmental impact.

In reality, however, some locations are much better than others at producing certain food items. For example, Californian strawberries are grown most of the year under almost ideal conditions (neither too humid nor too hot). As a result, one hectare of California land will yield over 50,000 kilograms of berries, compared to 7,000 to 10,000 in Ontario, in the process allowing for a much more intensive and efficient use of fuel, capital, machinery and other resources.[1]

Any realistic assessment of the environmental impact of food production must also reflect both transport to final consumers – not just to stores – and the total energy consumption and greenhouse gas emissions associated with production. Researchers using the so-called Life Cycle Assessment (LCA) methodology have shed much light on the issue (see Table 1).[2]

On the transportation side, the picture changes radically when one looks at the whole process instead of focusing exclusively on the country where the food item was produced. Consumers' transportation choices, such as walking or biking as opposed to driving, obviously affect the total CO_2 emissions associated with their food purchases.

A relatively significant greenhouse gas impact can be attributed to individual families making many small-volume shopping trips by car to transport food from retail stores to their homes. These cars are comparatively less efficient than bigger transportation modes that move food from the point of production to the retail location. Moving very large quantities of produce in super-efficient diesel-powered container ships requires much less energy per apple or lamb chop, even if the distance covered is much greater.

A 2005 study by the United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) is probably the most comprehensive analysis of the food-miles controversy to date. Among other findings, it showed that 82% of the estimated 30 billion food miles (the distance traveled between producers and consumers) associated with U.K.-consumed

Long range transportation of food by air or sea accounts for only a fraction of total gas emissions generated by various transport modes.

1. Pierre Desrochers and Hiroko Shimizu, "Buy Global," *Reader's Digest* (Canada), June 2009.
2. See, among others, the webpage of the U.S. Environmental Protection Agency on this approach at http://www.epa.gov/nrmrl/lcaccess/.

food are generated within the country, with car transport from shop to home accounting for 48% and heavy goods vehicles for 31%. Air and sea transport each amounted to less than 1% of food miles. In the worst case scenario, a U.K. consumer driving ten kilometres to buy Kenyan green beans emits more carbon per bag of beans than flying them from Kenya to the U.K.

Greenhouse gas emissions from food production

While long range transportation of food by air or sea accounts for only a fraction of total greenhouse gas emissions generated by various transport modes, transportation itself is not even the main cause of greenhouse gas emissions. The most energy-intensive segments of the agricultural production chain are instead related to the production stage (fertilizers, pesticides, irrigation, energy required to power machinery, etc.).

In the United States, a study showed that 11% of greenhouse gas emissions related to food were from the transportation segment as a whole, while 83% came from the production stage.

In the United States, a recent LCA study showed that 11% of greenhouse gas emissions related to food were from the transportation segment as a whole, while 83% came from the production stage.[3]

The DEFRA study mentioned above also compared emissions from energy used for U.K. and Spanish tomatoes and factored in the production stage and post-production transfer from Spain to the United Kingdom by land transportation. In this context, U.K. tomato production emits 2,394 kg of CO_2/ton compared to 630 kg/ton for Spanish tomatoes, with the significant difference being accounted for by the energy requirements of U.K. greenhouse production (about 90 percent of the energy used in this production), while Spanish production takes place in unheated, plastic-sheeted greenhouses.[4]

The importance of seasonality in terms of energy input and CO_2 emissions is also often easily forgotten by activists and consumers. In a study of the issue published in 2006, researchers concluded that because New Zealand is located in the southern hemisphere where the growing season coincides with the northern hemisphere's winter, shipping freshly picked New Zealand apples and selling them quickly to U.K. consumers during their winter season entails less greenhouse gas emissions than the purchase by U.K. consumers of U.K. apples that have been in storage for several months.[5]

In general, physical environments like Canada's that require significant heating and/or cold protection facilities and technologies entail much greater energy consumption than more favorable climates, often on a scale that dwarfs the energy requirements associated with the transportation of agricultural products from more remote locations.

The economic costs of subsistence agriculture

A focus on consuming mostly local produce and eschewing trade — subsistence agriculture, which is what food miles boil down to if pushed to its logical conclusion — is unrealistic and implies significant trade-offs. Restrictive local food policies would imply, even in the world's currently most advanced and productive agricultural areas, much higher prices and a drastic reduction in the quantity and diversity of foods available for human consumption.

The most radical proponents of the food mile perspective are those who voluntarily limit their food consumption to items grown or caught within a 100-mile radius of their residences. One of the best-documented cases is a Canadian couple based in southwest British Columbia (perhaps Canada's most ecologically diverse and productive agricultural region) who, in 2005, took up this eco-challenge for a year and documented their experiences online and in a book.[6] Their experiment quickly highlighted some fundamental problems with the 100-mile approach:

3. Alison Smith *et al.*, *The Validity of Food Miles as an Indicator of Sustainable Development*, Report ED50254, Issue 7, July 2005, p. 30.
4. Christopher L. Weber and H. Scott Matthews, "Food-Miles and the Relative Climate Impacts of Food Choices in the United States," *Environmental Science & Technology*, Vol. 42, No. 10 (May 15, 2008), pp. 3508-3513.
5. Alison Smith *et al.*, *op. cit.*, footnote 3.
6. Caroline Saunders, Andrew Barber, and Greg Taylor, *Food Miles - Comparative Energy/Emissions Performance of New Zealand's Agriculture Industry*, Research Report No. 285, Agribusiness & Economics Research Unit, Lincoln University, July 2006.

- Cost: Locally grown organic products or substitutes for conventional products, in general, cost more (often significantly more) than conventional products.

- Lack of variety: Sugar, rice, lemon, ketchup, olive oil, peanut butter, orange juice, and flour could not be produced locally. In winter, only a very narrow selection of vegetables was available.

- Time: The time spent acquiring and preparing food was comparable to holding a part-time job.

Of course, these problems were actually mitigated by the fact that the couple did not forego access to a wide range of services, such as sophisticated health care, which were available to them only because food imports made it possible for other individuals to specialize in nonagricultural activities. Still, this experiment does help illustrate the large and very tangible benefits of trade and the sophisticated division of labor it allows.

Conclusion

Buying fresh produce in farmers market and socializing with one's neighbours may be good reasons to buy locally produced food, but saving the planet, or improving the local economy, are not.

Restrictive local food policies would imply much higher prices and a drastic reduction in the quantity and diversity of foods available for human consumption.

Food-mile activists often promote the economic benefits of local purchases, in as much as they imply higher incomes for local producers. Missing from this perspective, however, is the fact that, if imposed by political intervention, farmers' gains can only come at the expense of consumers who will be forced to pay higher prices for similar food items, or similar prices for lesser quality food items, than would otherwise be the case (if not, there would be no need to adopt coercive policies to penalize agricultural items produced in more distant regions). Because consumers and taxpayers have less money available for other purchases or investments as a result of such policies, the local economy is made worse off overall. They also harm farmers in developing countries who are deprived of an opportunity to improve their economic conditions.

In a modern economy, people specialize in what they do best and trade with one another. This ensures both lower prices and a greater variety and year-round supply of goods. This is why feeding a growing world population in a sustainable manner requires agricultural free trade, to insure that food is produced the most efficiently in the most suitable locations, in the process economizing on all required inputs and creating more wealth and a better environment for everyone.

7. See Alisa Smith and J. B. MacKinnon, "Living on the 100-Mile Diet," *The Tyee*, June 28, 2005; Alisa Smith and J. B. MacKinnon, *The 100-Mile Diet: A Year of Local Eating*, Random House Canada, 2007.

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