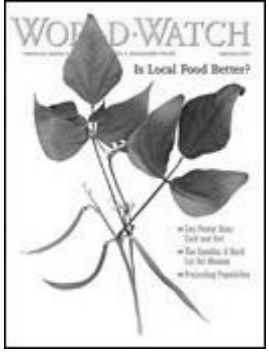

Is Local Food Better?

by **Sarah DeWeerdt**

Yes, probably-but not in the way many people think.

(Editor's note: The local-food movement has been gaining momentum in developed countries, and in many developing countries as well, in recent years; in the United States alone, sales of locally grown foods, worth about $4 billion in 2002, could reach as much as $7 billion by 2011. Local food's claimed benefits are driving health- and environment-conscious consumers to seek alternatives to the industrial agriculture system whose products dominate grocery-store shelves. It is also linked to the localization efforts of people who believe that rising transport costs and reaction to globalization will trigger a shortening of economic links and greater reliance on local and regional economies. This two-part series examines the potential impacts of greater localization of food, beginning with the environmental effects and then, in our July/August issue, the economic implications.)

by Sarah DeWeerdt

In 1993, a Swedish researcher calculated that the ingredients of a typical Swedish breakfast-apple, bread, butter, cheese, coffee, cream, orange juice, sugar-traveled a distance equal to the circumference of the Earth before reaching the Scandinavian table. In 2005, a researcher in Iowa found that the milk, sugar, and strawberries that go into a carton of strawberry yogurt collectively journeyed 2,211 miles (3,558 kilometers) just to get to the processing plant. As the local-food movement has come of age, this concept of "food miles" (or "-kilometers")-roughly, the distance food travels from farm to plate-has come to dominate the discussion, particularly in the United States, the United Kingdom, and parts of Western Europe.

The concept offers a kind of convenient shorthand for describing a food system that's centralized, industrialized, and complex almost to the point of absurdity. And, since our food is transported all those miles in ships, trains, trucks, and planes, attention to food miles also links up with broader concerns about the emissions of carbon dioxide and other greenhouse gases from fossil fuel-based transport.

In the United States, the most frequently cited statistic is that food travels 1,500 miles on average from farm to consumer. That figure comes from work led by Rich Pirog, the associate director of the Leopold Center for Sustainable Agriculture at Iowa State University (he is also behind the strawberry-yogurt calculations referenced above). In 2001, in some of the country's first food-miles research, Pirog and a group of researchers analyzed the transport of 28 fruits and vegetables to Iowa markets via local, regional, and conventional food distribution systems. The team calculated that produce in the conventional system-a national network using semitrailer trucks to haul food to large grocery stores-traveled an average of 1,518 miles (about 2,400 kilometers). By contrast, locally sourced food traveled an average of just 44.6 miles (72 kilometers) to Iowa markets.

In light of such contrasts, the admonition to "eat local" just seems like common sense. And indeed, at the most basic level, fewer transport miles do mean fewer emissions. Pirog's team found that the

conventional food distribution system used 4 to 17 times more fuel and emitted 5 to 17 times more CO_2 than the local and regional (the latter of which roughly meant Iowa-wide) systems. Similarly, a Canadian study estimated that replacing imported food with equivalent items locally grown in the Waterloo, Ontario, region would save transport-related emissions equivalent to nearly 50,000 metric tons of CO_2, or the equivalent of taking 16,191 cars off the road.

What's "Local"?

But what exactly is "local food" in the first place? How local is local?

One problem with trying to determine whether local food is greener is that there's no universally accepted definition of local food. Alisa Smith and J.B. MacKinnon, authors of The 100-Mile Diet, write that they chose this boundary for their experiment in eating locally because "a 100-mile radius is large enough to reach beyond a big city and small enough to feel truly local. And it rolls off the tongue more easily than the '160-kilometer diet.'" Sage Van Wing, who coined the term "locavore" with a friend when she was living in Marin County, California, was inspired to eat local after reading Coming Home to Eat, a chronicle of author Gary Paul Nabhan's own year-long effort to eat only foods grown within 250 miles of his Northern Arizona home. She figured that if Nabhan could accomplish that in the desert, she could do even better in the year-round agricultural cornucopia that is Northern California, so she decided to limit herself to food from within 100 miles.

There's some evidence that a popular understanding of local food is, at least in some places, coalescing around this 100-mile limit. A 2008 Leopold Institute survey of consumers throughout the United States found that two-thirds considered local food to mean food grown within 100 miles. Still, a variety of other definitions also persist. Sometimes local means food grown within a county, within a state or province, or even, in the case of some small European nations, within the country. In the United Kingdom, reports Tara Garnett of the Food Climate Research Network, "on the whole, organizations supporting local are now less likely to put numbers on things." Meanwhile, rural sociologist Clare Hinrichs, of Pennsylvania State University, has found that in Iowa local has shifted from signifying food grown within a county or a neighboring one to food grown anywhere in the state. For some in the agricultural community, promoting and eating "local Iowa food" is almost a kind of food patriotism, aimed at counteracting the forces of globalization that have put the state's family farmers at risk.

All of those are perfectly valid ways of thinking about local. But they don't have all that much to do with environmental costs and benefits.

Tradeoffs

In any case, warns Pirog, food miles/kilometers don't tell the whole story. "Food miles are a good measure of how far food has traveled. But they're not a very good measure of the food's environmental impact."

That impact depends on how the food was transported, not just how far. For example, trains are 10 times more efficient at moving freight, ton for ton, than trucks are. So you could eat potatoes trucked in from 100 miles away, or potatoes shipped by rail from 1,000 miles away, and the greenhouse gas emissions associated with their transport from farm to table would be roughly the same.

The environmental impact of food also depends on how it is grown. Swedish researcher Annika Carlsson-Kanyama led a study that found it was better, from a greenhouse-gas perspective, for Swedes to buy Spanish tomatoes than Swedish tomatoes, because the Spanish tomatoes were grown in open fields while the local ones were grown in fossil-fuel-heated greenhouses.

That seems obvious, but there are subtler issues at play as well. For example, Spain has plenty of the warmth and sunshine that tomatoes crave, but its main horticultural region is relatively arid and is likely to become more drought-prone in the future as a result of global climate change. What if water shortages require Spanish growers to install energy-intensive irrigation systems? And what if greenhouses in northern Europe were heated with renewable energy?

Perhaps it's inevitable that we consumers gravitate to a focus on food miles-the concept represents the last step before food arrives on our tables, the part of the agricultural supply chain that's most visible to us. And indeed, all other things being equal, it's better to purchase something grown locally than the same thing grown far away. "It is true that if you're comparing exact systems, the same food grown in the same way, then obviously, yes, the food transported less will have a smaller carbon footprint," Pirog says.

But a broader, more comprehensive picture of all the tradeoffs in the food system requires tracking greenhouse gas emissions through all phases of a food's production, transport, and consumption. And life-cycle analysis (LCA), a research method that provides precisely this "cradle-to-grave" perspective, reveals that food miles represent a relatively small slice of the greenhouse-gas pie.

In a paper published last year, Christopher Weber and H. Scott Matthews, of Carnegie Mellon University, wove together data from a variety of U.S. government sources into a comprehensive life-cycle analysis of the average American diet. According to their calculations, final delivery from producer or processor to the point of retail sale accounts for only 4 percent of the U.S. food system's greenhouse gas emissions. Final delivery accounts for only about a quarter of the total miles, and 40 percent of the transport-related emissions, in the food supply chain as a whole. That's because there are also "upstream" miles and emissions associated with things like transport of fertilizer, pesticides, and animal feed. Overall, transport accounts for about 11 percent of the food system's emissions.

By contrast, Weber and Matthews found, agricultural production accounts for the bulk of the food system's greenhouse gas emissions: 83 percent of emissions occur before food even leaves the farm gate. A recent life-cycle analysis of the U.K. food system, by Tara Garnett, yielded similar results. In her study, transport accounted for about a tenth of the food system's greenhouse gas emissions, and agricultural production accounted for half. Garnett says the same general patterns likely also hold for Europe as a whole.

There's Something about Dairy

The other clear result that emerges from these analyses is that what you eat matters at least as much as how far it travels, and agriculture's overwhelming "hotspots" are red meat and dairy production. In part that's due to the inefficiency of eating higher up on the food chain-it takes more energy, and generates more emissions, to grow grain, feed it to cows, and produce meat or dairy products for human consumption, than to feed grain to humans directly. But a large portion of emissions associated with meat and dairy production take the form of methane and nitrous oxide, greenhouse gases that are respectively 23 and 296 times as potent as carbon dioxide. Methane is produced by ruminant animals (cows, goats, sheep, and the like) as a byproduct of digestion, and is also released by the breakdown of all types of animal manure. Nitrous oxide also comes from the breakdown of manure (as well as the production and breakdown of fertilizers).

In Garnett's study, meat and dairy accounted for half of the U.K. food system's greenhouse gas emissions. In fact, she writes, "the major contribution made by agriculture itself reflects the GHG [greenhouse gas] intensity of livestock rearing." Weber and Matthews come to a similar conclusion: "No matter how it is measured, on average red meat is more GHG-intensive than all other forms of food," responsible for about 150 percent more emissions than chicken or fish. In their study the second-largest contributor to emissions was the dairy industry.

Nor are these two studies unique in their findings. A group of Swedish researchers has calculated that meat and dairy contribute 58 percent of the total food emissions from a typical Swedish diet. At a global level, the UN Food and Agriculture Organization has estimated that livestock account for 18 percent of all greenhouse gas emissions-more even than all forms of fossil fuel-based transport combined.

"Broadly speaking, eating fewer meat and dairy products and consuming more plant foods in their place is probably the single most helpful behavioral shift one can make" to reduce food-related greenhouse gas emissions, Garnett argues.

Weber and Matthews calculated that reducing food miles to zero-an all-but-impossible goal in practice-would reduce the greenhouse gas emissions associated with the food system by only about 5 percent, equivalent to driving 1,000 miles less over the course of a year. By comparison, replacing red meat and dairy with chicken, fish, or eggs for one day per week would save the equivalent of driving 760 miles per year. Replacing red meat and dairy with vegetables one day a week would be like driving 1,160 miles less. "Thus," they write, "we suggest that dietary shift can be a more effective means of lowering an average household's food-related climate footprint than ‘buying local.'"

However, Weber acknowledges, "these calculations were done assuming that local foods are no different than non-local foods." And that's not always the case. For example, local-food advocates also emphasize eating seasonal (often meaning field-grown) and less-processed foods. Those qualities, along with shorter distances from farm to table, will also contribute to lower emissions compared to the "average" diet.

Food marketed in the local food economy-at farmers' markets and through community-supported agriculture (CSA) schemes-is frequently also organic. Organic food often (though not always) is associated with lower greenhouse gas emissions than conventionally grown food, because organics don't generate the emissions associated with production, transport, and application of synthetic fertilizers and pesticides.

Organic food also has other environmental benefits: less use of toxic chemicals promotes greater farmland biodiversity, and organic fields require less irrigation under some conditions. Because local food is so frequently talked about in terms of food miles, its environmental benefits have largely been couched in terms of greenhouse gas emissions. But food's carbon footprint "can't be the only measuring stick of environmental sustainability," notes Gail Feenstra, a food systems analyst at the University of California at Davis Sustainable Agriculture Research and Education Program.

Finally, farmers who market locally are often relatively small in scale, and can more feasibly adopt environmentally beneficial practices such as growing a diversity of crops, planting cover crops, leaving weedy field borders or planting hedgerows that provide a refuge for native biodiversity, and integrating crop and livestock production. In short, Weber says, "the production practices matter a lot more than where the food was actually grown. If buying local also means buying with better production practices then that's great, that's going to make a huge difference."

Of course, the relationship between local food marketing and sustainable agricultural practices is far from perfect. A small farmer can still spray pesticides and plow from road to road. Not all farmers-market vendors are organic. Clare Hinrichs, who calls herself an "ardent" farmers-market shopper, nevertheless acknowledges that "the actual consequences-both intended or unintended-[of local food systems] haven't really been all that closely or systematically studied."

How Green Is My Valley?

So, is local food greener? Not necessarily. But look at the question from the opposite direction: if you're a consumer interested in greener food, the local food economy is currently a good place to find it. By the same token, a farmer who sells in the local food economy might be more likely to adopt or continue sustainable practices in order to meet this customer demand. If local food has environmental benefits, they aren't all-or perhaps even mainly-intrinsic to local-ness. Or, as Hinrichs has written, "it is the social relation, not the spatial location, per se, that accounts for this outcome."

For local food advocates like Sage Van Wing, that interaction between producer and consumer, between farmer and eater, is precisely the point. Regarding food miles, Van Wing says, "I'm not interested in that at all." For her, purchasing an apple isn't just about the greenhouse gas emissions involved in producing and transporting the fruit, "it's also about how those apples were farmed, how the farm workers were treated"-a broad array of ecological, social, and economic factors that add up to sustainability. Interacting directly with the farmer who grows her food creates a "standard of trust," she says.

Christopher Weber, who followed a vegan diet for 10 years and calls himself "somewhat of a self-proclaimed foodie," agrees: "That's one thing that's really great about local food, and one of the reasons that I buy locally, is because you can actually know your farmer and know what they're doing."

Van Wing says that her approach to local food has evolved over time-she started out trying to eat within a 100-mile radius, but now she simply tries to get each food item from the closest source feasible. Foods that can't be grown nearby are either rare treats or have disappeared from her diet altogether. "I just don't do things that don't make sense," she says. Her statement echoes journalist and sustainable-agriculture guru Michael Pollan, who in his recent book In Defense of Food offers a common-sense guide to eating ethically and well: "Eat food. Not too much. Mostly plants." You could sum up the ecological case for eating locally by adding one more sentence: "Mostly what's in season and grown not too far away."

Yet there are limits to this common-sense approach. In many areas, the climate is such that eating local, seasonal, field-grown produce would be a pretty bleak proposition for much of the year. Large concentrations of people live in areas not suited to growing certain staple crops; it's one thing to forego bananas, but quite another to give up wheat. And population density itself works against relocalization of the food system. Most of the land within 100 miles of large cities such as New York is itself very built up; where will the farmland to feed us all locally come from? (By the same token, that very situation makes preservation of what farmland remains all the more important, a goal that buying from local farmers can help advance.)

In this sense, life-cycle analyses of the current food system offer a paradoxically hopeful perspective, because they suggest that, if the goal is to improve the environmental sustainability of the food system as a whole, then there are a variety of public policy levers that we can pull. To be sure, promoting more localized food production and distribution networks would reduce transport emissions. But what if a greater investment in rail infrastructure helped to reverse the trend toward transporting more food by inefficient semi-truck? What if fuel economy standards were increased for the truck fleet that moves our food? Or, to name one encompassing possibility, what if a carbon-pricing system incorporated some of the environmental costs of agriculture that are currently externalized? Local food is delicious, but the problem-and perhaps the solution-is global.