

Making “Locally Grown” a Year-Round Reality:

How a Hydroponic Greenhouse in Lower Makefield, PA, Reduces Food Miles and May Potentially Alter the US Food Supply Chain

In her book *Animal, Vegetable, Mineral*, Barbara Kingsolver recalls being served California raspberries in the dead of winter at a dinner party in New York. When Kingsolver comments on the berries, her hostess boasts: “This is New York. We can get anything we want, any day of the year.” Kingsolver reluctantly but politely eats the raspberries, thinking: “...we get it at a price. Most of that is not measured in money, but in untallied debts that will be paid by our children in the currency of extinctions, economic unravelings, and global climate change.”¹

The Problem with Today’s Food Supply Chain

Kingsolver’s story eloquently describes a major issue in our food supply chain: the long distances food travels from farm to table.

It wasn’t always this way.

Until the 1950s, Americans mainly consumed local or regionally grown produce. However, when interstate highways, refrigerated trucks, and cheap gasoline appeared, things began changing. Then California began promoting itself as an off-season food producer.² Suddenly the variety of available foods expanded.

Today, produce typically travels up to 2500 miles from farm to table -- 25% further than it traveled in 1980.³ As a consequence, fruits and vegetables are bred for uniformity and travel-tolerance,⁴ products once rare in certain parts of the county are commonplace, and the phrase 'out of season' has lost virtually all meaning.

There are other drawbacks too. Moving food long distances hurts the environment. It consumes fuel, generates greenhouse gases, and pollutes the air. It affects food quality -- growers often elect to raise varieties of fruit and vegetables that travel well, not varieties that are fragile but tasty.⁵ There are also economic consequences. A long trip from farm to table means a shorter shelf life, rising fuel prices increase produce prices, and lack of support for small food producers affects local economies⁶

The Limits of Buying Local

Like Kingsolver, many are waking up to the idea that this system is unsustainable. One way to avoid negative impacts is to buy local. Statistics suggest the number of people choosing to do so is growing. More than half of consumers say it's more important to buy local than organic, according to market research.⁷ In 1990, the US had 60 Community Supported Agriculture farms. In 2007, there were 1150. Furthermore, over the same time period, farmers markets increased from 1500 to over 4500.⁸

In theory, buying local sounds simple. And maybe it is -- in California. But in places like Pennsylvania, fresh local produce is only available during the summer months. Few of us will freeze and preserve local produce in July and August. We just buy tasteless tomatoes in January

and dream of summer. But now McCaffrey's, an independent supermarket in Bucks County, PA, is seeking to change this.

Making Local Available Year-Round: The McCaffrey's/Bright Farms Project

McCaffrey's is collaborating with Bright Farms, a Manhattan-based developer of hydroponic greenhouses, to build a hydroponic greenhouse near its grocery stores. The greenhouse will supply fresh produce to McCaffrey's three supermarkets making fresh local produce a reality year-round. Construction of the greenhouse will begin in the second half of 2012. Some facts about the greenhouse are as follows:

- The greenhouse will cover 50,000 square feet.
- Its first crops will be tomatoes, lettuces, herbs, and cucumbers but any field-grown crop can be grown hydroponically.
- Computers will control light, heat, ventilation, and other elements, creating microclimates tailored to the needs of different crops.
- About 500,000 pounds of produce will be produced, about the same amount that can be grown on an acre of farmland.⁹
- One full-time manager and master grower will oversee operations.
- Five full-time employees will monitor the greenhouse environment and manage harvest, processing, and packaging.¹⁰

In terms of food miles, produce from the greenhouse will easily meet the definition of "local." Once harvested, produce will travel by truck from the greenhouse to three McCaffrey's markets, one in West Windsor, NJ (about 22 miles away), one in Princeton, NJ (19 miles away)

and one in Lower Makefield (less than 1 mile away). “We liked the whole idea of reducing the use of fuel, the freshness, the quality, the whole sustainability concept,” says Tony Mirack of McCaffrey’s.¹¹

Hydroponic Agriculture

Hydroponic greenhouses are widely used around the world and can be built everywhere, including on rooftops in cities where farmland is scarce and sites where soil is contaminated by industrial activity. This is because hydroponics is a growing method that doesn’t use soil. Instead, plants are anchored in an inert medium, like rock wool, coir fiber, or sand, and fed a liquid solution containing various nutrients.¹²

Hydroponic farming is highly sustainable. These systems use as little as 10% of the water of traditional agriculture and can be run on sterilized rainwater. They require no herbicides and integrated pest management is used for pest control to reduce chemicals. Since plants are fed directly through their roots, little fertilizer is needed and with no fields to spray, there is no risk to soil or groundwater. Hydroponic gardens are also extremely efficient, producing the same yields as conventional farms in about 1/5 the space.¹³

Business and Local Issues

McCaffrey’s initially wanted a greenhouse on the roof of their Lower Makefield supermarket, but space issues prevented that. Instead, the greenhouse will be built on open space leased owned by Lower Makefield Township, PA. Bright Farms will lease the land for 10 years with an option to extend the contract twice, three years for each extension. Bright Farms

will pay Lower Makefield \$20,000 the first year, and another \$1,000 each year thereafter until the fifth year. Once the lease reaches \$25,000, rent will increase according to the cost of living.¹⁴ At the end of the term, Bright Farms will remove the greenhouse, which is designed to break down without permanently impacting the environment in any way.

Not everyone in Lower Makefield Township liked the plan to use taxpayer purchased open space for private enterprise. However the majority of Township supervisors supported the move. Only one of the five voted against the plan.¹⁵ It is only conjecture but this may have passed quickly because in the current economy Lower Makefield's revenues have declined and the lease brings an appreciated infusion of cash to the municipality.

Another community concern was that the greenhouse would hurt local farmers. In fact, the Lower Makefield Environmental Advisory Council approved the greenhouse only if it was shown *not* to affect local farmers.¹⁶ As it turned out, this was not an issue. McCaffrey's does buy some produce from local farmers but the items grown at the new greenhouse aren't items McCaffrey's purchases locally so they won't be affected.

Contractual Matters

According to Allison Kopf of Bright Farms, what's really new and different about the McCaffrey's-Bright Farms partnership, is the financing. "The Dutch have perfected hydroponic technology. What's innovative here is the business model," she says.¹⁷ Kopf is referring to what Bright Farms called the Produce Purchase Agreement. This agreement is modeled after the Power Purchase Agreement, a type of contract common in the energy business. The Power Purchase Agreement is used when a utility company builds an energy source and sells power to a

buyer at a set price over a certain time period. The Produce Purchase Agreement is similarly structured. Bright Farms builds the greenhouse and McCaffrey's purchases produce at a fixed price for a set time period which, in this case, is 10 years.

It's a win-win-win situation. McCaffrey's gets stable pricing and a steady supply of produce at a predetermined quality level. McCaffrey's customers get ripe, reasonably-priced locally grown, quality products year-round (Tony Mirack of McCaffrey's says Bright Farms produce will be less expensive because transportation costs have been eliminated).¹⁸ Bright Farms reaps about \$1 million to \$1.5 million in revenue annually.¹⁹

Future Benefit

The food distribution system in the United States has adapted to many technological and market changes in the past decades. The need for more sustainable practices and the example set by partnerships like the one between Bright Farms and McCaffrey's market have the potential to reduce the distance from farm to table in many regions and supply fresh local produce no matter what kind of climate, soil, water, or other conditions exist. The hope is that if this business model is successful, other supermarkets will build greenhouses near their own stores, reducing the number of crops that are trucked or flown long distances. If copied elsewhere, this approach has the potential to dramatically change the food distribution system in America.

¹ Kingsolver P. 67

² Kingsolver. P. 48

³ Wann. P. 104

⁴ Kingsolver. P.48

⁵ Kingsolver. P. 48

⁶ <http://aaea.confex.com/aaea/2011am/webprogrampreliminary/Paper12995.html>

⁷ <http://news.yahoo.com/index-ranks-vermont-tops-locally-grown-food-070611920.html>

⁸ <http://www.locavore.ws/2009/01/some-interesting-locavore-statistics.html>

⁹ Allison Kopf. (2012). Personal Communication

¹⁰ Allison Kopf. (2012). Personal Communication

¹¹ Tony Mirack. (2012). Personal Communication

¹² <http://hydroponicfarming.net/>

¹³ <http://www.plantcare.com/gardening-guides/hydroponic-gardening/benefits-of-hydroponic-gardening.aspx>

¹⁴ http://www.buckslocalnews.com/articles/2012/05/19/yardley_news/news/doc4fa821622b479794516478.txt

¹⁵ http://www.buckslocalnews.com/articles/2012/05/19/yardley_news/news/doc4fa821622b479794516478.txt

¹⁶ Lower Makefield Township Environmental Advisory Council Meeting Minutes. February 8, 2012.

¹⁷ Alison Kopf (2012). Personal Communication.

¹⁸ Tony Mirack. (2012). Personal Communication.

¹⁹ Allison Kopf. (2012). Personal Communication

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