

Sustainability of Local Food Systems:

Practices and Motivations of Farmers at St. Louis Farmers Markets

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Senior Honors Thesis

March 2010

St. Louis, Missouri

Acknowledgements

I'd like to thank my thesis advisor, Dr. Clare Palmer, for her support and guiding comments during the creation of this paper. Thanks too to my readers, Dr. Glenn Stone and Dr. Matt Fry, and all who have edited the text and given perspective on this process. Most of all, thanks to the farmers who participated in this study and offered their experience and insight into the age old practice of growing food for others.

Table Contents

I.	Introduction and Background.....	3
II.	<i>Questioning the Local.....</i>	<i>9</i>
	<i>a. Social Effects of Local Food System</i>	
	<i>b. Economic Effects of Local Food System</i>	
	<i>c. Environmental Effects of Local Food System</i>	
III.	<i>The Study: A Closer Look at St. Louis Local Food.....</i>	<i>21</i>
IV.	<i>Overview of Farmers Markets.....</i>	<i>22</i>
V.	<i>Methods.....</i>	<i>26</i>
	<i>a. recruitment for farmer interviews</i>	
	<i>b. interview process</i>	
	<i>c. Data analysis</i>	
	<i>d. Limitations of this Study</i>	
VI.	<i>Results.....</i>	<i>29</i>
	<i>a. Characteristics of Sample</i>	
	<i>b. Marketing</i>	
	<i>c. Practices</i>	
	<i>d. Consumer Driven Change</i>	
	<i>e. Data Analysis</i>	
VII.	<i>Discussion.....</i>	<i>34</i>
	<i>a. Marketing</i>	
	<i>b. Alternative/Conventional differences</i>	
	<i>c. Potential for transitioning</i>	
	<i>d. Barriers to Organic Certification and More Sustainable Practices</i>	
	<i>e. Consumer impact on farmers practices</i>	
VIII.	<i>Conclusion.....</i>	<i>55</i>

Introduction

This paper investigates the rising interest in local food and its potential to increase the sustainability of the American food system. First I define the concept of sustainability as it pertains to agro-food systems based on the three pillars of (a) building a more just society, (b) maintaining and building the capacity of the earth to produce enough food for humankind, (c) and making it economically viable. Then I briefly describe the failings of the dominant food system today and how “local food” has been proposed as a possible solution these problems. I then question in depth the claims that local is more sustainable, measuring in terms of the three “pillars” of agricultural sustainability: social, environmental and economic. I argue that local food has the potential to increase sustainability, but that this is very difficult if not impossible to generalize across region and product. More critical analysis is needed, though it is difficult to obtain sufficient data to arrive at a clear determination either way.

Narrowing down to one of the pillars of sustainability, environmental or ecological sustainability, I assess the particular circumstances of St. Louis’ farmers’ markets, one of the key modes of direct marketing and where much local food is sold. Choosing farmers who sell at farmers markets as my sample, I gathered data on basic biographical information, their marketing practices, their growing methods, and their motivations behind these practices in order to better understand local farmers’ beliefs and attitudes pertaining to sustainability. My hypothesis was that food found at farmers’

markets would be grown in a more ecologically sound manner than the average food grown nationwide.

Analyzing the results I found that compared to all farms nationally, those at the St. Louis farmers market may employ more ecologically sustainable practices, but, because of inconsistencies in the way ecological sustainability is measured or approximated, direct comparison is impossible. I also discuss the relationships between “conventional” and “alternative” farmers at the market, finding differences in age and attitude, which in turn influences relations between the groups and the potential for transition from conventional to alternative practices. Indeed, I find such a shift to more sustainable practices is very possible and already occurring on the local level. However the impact of this shift must be viewed in the context of the larger system and the uncertain future of the growing - but immature - local food system. The ecological sustainability of the local food system varies from case to case, but the trend toward more sustainable practices shown by incoming farmers in the local system suggest at least that the average farmer who sells locally is more concerned about ecological sustainability than the average American farmer. Challenges identified for the future include expanding sustainable local production into larger markets (such as institutions) and scaling up positive aspects of the local food system (such as transparency).

The Concept of a Sustainable Agriculture

The primary goal of any food system is to provide enough food to support healthy human lives. In addition to this basic function many academics have proposed that food systems should also fulfill a number of other goals that the current system is not reaching,

or is not meeting well enough. Such an alternative system has been called “civic”, “just” or plainly “good” (Lyson 2000; Connell et al. 2008; Kloppenburg et al. 2000; Allen et al. 2003). All these propose to varying degrees a food system that, as Allen et al (2003) call it, is “environmentally sustainable, economically viable and socially just”. In this paper I will subsume these three characteristics within the USDA’s term “sustainable agriculture” defined as:

An integrated system of plant and animal production practices having a site-specific application that will, over the long term: 1) satisfy human food and fiber needs; 2) enhance environmental quality and the natural resource base upon which the agricultural economy depends; 3) make the most efficient use of non-renewable resources and integrate, where appropriate natural biological cycles and controls; 4) sustain the economic viability of farm operations; and 5) enhance the quality of life for farmers and society as a whole. (Lyson 2000 p 78, FACTA 1990).

This definition incorporates parts of the three pillars of sustainability: environmental health/ecological integrity, equity/social benefits, and economic/financial feasibility. These three components are tied together in sustainable agriculture and often overlap. The production of wealth can contribute to social wellbeing. A healthy environment contributes to human health. Such a definition places agriculture within the wider perspective of a whole ecosystem where the farm is not merely a food factory, but also a contributor to larger ecosystem functions. Sustainable agriculture also seeks to improve the lives of those connected to agriculture, while at the same time continuing to produce food in an economically feasible way.

It is important to note that sustainable agriculture is a contested term and groups ranging from small-scale farmers to large agribusiness interests redefine sustainable agriculture to serve their own interests. Monsanto, a chemical and biotechnology corporation, stakes claims to sustainable agriculture through its technology of genetic engineering, but many activists refute these claims (Corporate Responsibility, Sustainable Agriculture; Millions Against Monsanto Campaign). DuPont's idea of a sustainable food system is one that is "ecologically sound, economically viable, and socially acceptable". This is a similar framework to the one seen above, but definitions of what is "ecologically sound" vary greatly and social acceptability says nothing about social justice or equality (Kloppenborg et al. 2000).

Controversial new technologies such as genetic modification and biofuels are illustrative of this debate. Many propose these technologies as the way to progress sustainably into the 21st century while others proclaim they will lead to even more environmental destruction. How are they enacted and the exact nature of these technologies remains to be seen and therefore so do their implications for sustainability in agriculture (Pretty 2001, Robertson et al 2008). Like genetic modification or biofuels, local food is proclaimed to increase sustainability, but evidence for this is not definitive.

The Dominant Food System

The majority of people living in contemporary American society are disconnected from their food. They do not know where it comes from, who picked it, or who owns the land on which it was grown or raised. Considering all of human history up to now, this is a massive shift in our relation to food (Jaffe and Gertler 2006).

This disconnect is caused by increased specialization, scale, and globalization. Food now can travel across the globe in a shorter time than ever before, making it possible to send fresh fruits and vegetables across hemispheres and from summer to winter for consumption (McMichael 2000). Farmers are more closely tied to their counterparts on the other side of the planet than ever before. Fluctuating prices in commodity crops, caused on one continent, can destabilize farmers living on another contributing to the increased urbanization of the human population and potentially decreasing food security (Levy and van Wijnbergen 1992).

Running parallel to this globalization is an industrialization of agriculture that has transformed farms into mechanized monocultures dependent on synthetic fertilizers, pesticides, and fossil fuels. While agriculture has historically been in some senses at least, a destructive practice, the degree of harm to ecosystems has reached new levels at the same time that yields are greater than ever before. The negative externalities of this system are well documented and massive: aquifer depletion, dead zones in oceans, toxic manure lagoon spills, soil erosion and decreased biodiversity of food crops, to name a few. The impacts of the industrialized food system are so great that they are even significantly affecting global systems like the oceans and the climate (Diaz and Rosenberg 2008; Burkholder et al. 2007; Heller and Keoleian 2000).

In addition to the environmental problems associated with conventional commodity agriculture, other serious issues include concerns about antibiotic resistant bacteria, depressed rural communities, the exploitation of cheap labor and the abuse of migrant workers (Jackson 2003 p141; Lyson 2000 p60). Issues with animals raised in confined animal feeding operations (CAFOs) include animal suffering, the dehumanizing

working conditions, the energy wasted and the environmental impacts. Many sustainable agriculture proponents attack this system of livestock production and place animal welfare with the economic, social and environmental components of sustainability.

Even in its primary role: to provide food that nourishes, the conventional food system is failing. Although calories are more abundant than ever (Americans on average consume 3800 calories per capita per day), malnutrition is a severe problem world-wide (Abelson 2004; Blössner 2005). In the United States, the opposite is the greater problem: about one third of adults are obese and the incidence of diet related diseases like heart disease, and diabetes is increasing, especially among children (Flegal et al. 2010, Muller et al. 2007).

Local is the New Organic

As industrialized agriculture became increasingly mainstream, alternatives diverged and developed alongside their conventional counterpart. Organic, perhaps the most commonly recognized alternative, is a production method but also a wider philosophy that developed in reaction to the introduction of synthetic pesticides and fertilizers. “Organic” once connoted small-scale production where the land was farmed to minimize harm to the environment (Heckman 2006). The Organic Foods Production Act of 1990 codified the term “organic” which spurred the growth of the organic industry and its adoption of many conventional food system practices (high levels of processing; global, large-scale industrial production etc.) (Buck et al. 1997, Connell et al. 2008, Hall and Mogyorody 2001).

Losing its association with small-scale production and defined by a set of USDA standards not stringent enough for many, “organic” has given way to “local” as a new label of choice for many consumers concerned about eating ethically (Cloud 2007). A local food system, in the simplest sense, is a system in which food is grown and consumed nearby, but it carries with it many other connotations. Recent books by journalist Michael Pollan and author Barbara Kingsolver have further popularized the idea of local food in the public’s view (Connell et al. 2008). Through local food, some people believe they can reverse trends of economic concentration, social disempowerment, and environmental degradation, essentially achieving all three components of sustainable agriculture.

Evidence for this claim comes from numerous studies of the local food system (Kloppenburg 1996, Guptil & Wilkins 2002, Hinrichs 2003, Lyson 2000). Advocates for localizing the foodshed believe it can counter the ills of the globalized food system: “A sustainable food system is one in which ‘food is grown, harvested, processed, marketed, sold, and consumed as close to home as possible.’ (Kloppenburg 2000). Feenstra’s (1997) argument is representative: “the development of a local sustainable food system provides not only economic gains for a community but also fosters civic involvement, cooperation, and healthy social relations.” (Born and Purcell 2006).

Questioning the Local

However, with the rise in popularity of local food systems, there has also risen a wave of criticism from a number of fronts. First, highly variable definitions of “local” make conclusions about local systems difficult especially across studies which use

different criteria to decide what is “local”. Furthermore, as “local” has no inherent meaning other than “nearby”, it is potentially vulnerable to manipulation by some people who take advantage of consumers’ association with what it means to be “local”.

As far as agro-food system sustainability is concerned, the *economic* effects of the local food system appear to be positive for rural communities and the communities that hold farmers’ markets. The *social and community building* benefits of local food are uncertain, with both the potential for promoting a sense of interdependence and mutualism, but also isolationism and xenophobia (Hinrichs 2003). The *environmental* impacts are extremely difficult to measure (and will be discussed in more detail in the body of this paper). Though there may be reason to assume that farmers who sell locally have more benign practices than those who sell to larger markets, there is not strong evidence this is so. Additionally when considering greenhouse gas emissions due to transportation, local food may often have less of a carbon footprint, but there are many exceptions. The sustainability of the local food system is discussed below.

Despite the many benefits associated with localizing the food system, exactly what localization means is difficult to pin down. How close does food have to be grown for it to be “local”? Darby et al (2008) found that most consumers in a large Midwest state defined local by state lines, but that would likely change if the study had been conducted in a small state of the Northeast or a large state like California. The Merriam-Webster’s dictionary through its definition of “locavore” refrains from exactly defining “the local”, but the New American Oxford dictionary defines local as “within a 100-mile

radius”. For Wal-Mart, it is anything within state; some even define local as within country or not imported (Schmit 2008; Newman 2007; Smithers et al. 2008).

These various definitions show all spatial scales are human constructions. Even efforts to fit local within a biophysical reality rely on humans’ creation of such “bioregions” and drawing lines somewhere on the surface of the planet. The transition zones between one bioregion and another are rarely so sharp as to be clearly distinguishable or to prevent trade across them. Many of the positive characteristics associated with local food (freshness, health, sustainably and humanely raised etc.) are not inherent properties of a small-scale agriculture, but rather the result of other factors that may or may not correlate with a smaller scale. While some characteristics of the local, such as the greater ease of visiting the farm and thereby increase transparency, other positive outcomes of local food are not necessarily limited to the local, but could perhaps be incorporated into a larger system. For instance, the relatively high level of accountability and transparency in the local food system could perhaps be replicated on a larger scale by effective labeling of food and auditing of farmers.

This reveals the problem of simply pursuing localization as an end in itself, and not as a means towards a more sustainable agro-food system, a position called the “Local Trap” (Born and Purcell 2006). Indeed many academics and activists may have fallen into this trap, while others deliberately endorse it for their own benefit, co-opting the local brand for profit. Therefore, when assessing the merits of a local foodshed, it is essential to understand the processes by which positive outcomes arise, to recognize what about the local scale might be most emphasized to maximize sustainability.

The flexibility of “local” and its association with a number of qualities desirable to consumers makes it attractive for co-option by those seeking financial gain. Wal-Mart, by defining local as any product from within state, sells “local” CAFO raised pork, taking advantage of consumers assumption that local also means small scale and humane (Schmit 2008). This example reveals the problematic nature of “local”: it is highly malleable and full of contradictions that make it an unreliable indicator of sustainability.

Further complications arise when activists who witness the negative impacts of the globalized food system respond with the opposite of the binary: local. The problems of the global food system, it might be argued are not a result of its global scale per se, but rather its corporate capitalist industrialization that fails to internalize costs and rather pushes them onto people and the environment (Born and Purcell 2006; Hinrichs 2003). “Local” then gets credited to be everything that the global industrialized food system is not and is conflated with a whole range of ideas: “organic produce, better taste, increased health, avoiding GMOs, saving family farms, preserving open space, creating stronger communities, and even lowering taxes” (Born & Purcell 2006). While most academics are far more cautious when proclaiming the benefits of local food, this example shows the misleading rhetoric used to promote local food.

Social Effect of Local Food

Food consumption in America today is characterized by an anonymity that disguises of the social relations that bring food from farm to fork. Local food could make these relationships more visible and personal, increasing transparency and making food fresher (Smithers et al. 2008). The ideal local food system creates a transparent and

mutually beneficial relationship between consumer and farmer founded on trust. The farmer feels appreciated and the consumer receives a superior product while feeling good about supporting the sustainable production of food. A local food system would empower communities to take control of the food and foster values like “stewardship and self-reliance” (Ruttan 1997). This is the ideal.

While “local food systems can help to strengthen the sense of interdependency and mutualism that promotes community, and to facilitate feedback and communication”, this is not the necessary result of relocalization. Hinrichs (2003) identifies two broad social trajectories that local systems could follow. One promotes diversity and tolerance as well as the “interdependency and mutualism” mentioned above. Often immigrant populations looking for less mainstream products or those desiring organic or healthy foods can often find them through a local producer (Andreatta and Wickliffe 2002). The other trajectory is an “exclusive, inward-looking”, nativist, defensive, and “even semi-xenophobic” food localization that stresses cultural homogeneity. As a result localization becomes “elitist and reactionary” evidenced by the overpriced niche market foods also called “yuppie chow” (Feagan et al 2004).

Local food’s effect on farm laborers’ working conditions cannot be generalized as they vary greatly from region to region. However, local food might help support living wages for farmers through higher prices at markets and Community Supported Agriculture, in which community members invest in a farm for the growing season and receive a weekly box of produce in return.

Economic Effects of Local Food

Smaller and independently owned farms that direct market their products have a strong positive effect on the local rural economy. Direct marketing cuts out the middleman between farmer and consumer meaning higher revenue for farmers and (sometimes) lower prices for consumers (Andreatta and Wickliffe 2002). Farmers are reclaiming their historical share of the food dollar. “Fifty years ago, farmers in Europe and North America received between 45-60% of the money that consumers spent on food. Today, that proportion has dropped dramatically to just ...3.5% in the USA,” but by selling direct to local markets farmers can obtain 80-90% of food dollar (Pretty 2001).

Farmers’ markets also have been shown to have positive economic effects on the communities where they are located. Myers (2004) found “annual market revenues from an estimated 11,000 Howard County, Maryland farmers’ market shoppers totaled \$192,000, yielding direct and indirect economic benefits of \$307,249.” Myers estimated that the impact on neighboring businesses was \$965,788 for all three farmers’ markets studied. In Portland, Oregon, 24% of shoppers at the midweek market came downtown specifically to attend the market, then continued to shop downtown (USDA AMS 2010). Numerous other studies also show the same positive impact on the local economy—even when accounting for sales lost to other stores (Brown and Miller 2008).

A local food system would likely require many smaller-scale producers providing a diversity of products. Communities composed of smaller producers rather than large corporate or private company-owned farms ranked higher on a variety of quality of life measures such as better schools, more social services, more retail, and better living conditions (Lyson 2000 p 67). Furthermore, the profits from these independent producers

tend to remain in the community and have a multiplier effect of three to four (Gegner 2004).

How would a local food system affect the consumers' pocket book? At many farmers' markets or other direct marketing outlets, consumers pay less for what is almost always a high quality product. But at other markets, produce is marked up well above prices found in the average grocery store. The premium price is due mostly to demand, rather than a higher cost of production (Pretty 2005). Farmers can get a high price for their products and so sell at that rate. If the local system grew to such a degree that the demand was met, prices would drop. However, it's important to consider how a drop in price would affect farmer revenue and livelihood. If affordable food for consumers runs counter to farmers' economic prosperity, the viability of the farmers' market comes into question. Government support for low income citizens through Electronic Benefit Transfers for food purchases increases access to market produce and at participating markets helps to resolve this potential conflict by making high quality food more affordable while supporting prices for local farmers.

From a different perspective, the relatively high prices for local food could instead be seen as reasonable, given the artificially low price of conventional food, which externalizes costs and is often directly subsidized. (However, it is possible to be both local and conventional, so it cannot be said that all local farmers internalize environmental costs). Along with the trends of industrialization and consolidation, food prices have dropped (though this point is disputed by those who argue the development of a food oligarchy increases prices), yet they have largely dropped by externalizing costs. Exactly how much of the cost is being taken on by the environment and human health is

difficult to measure, but food prices would rise significantly if these costs were internalized (Tegtmeier and Duffy 2005). If local food already internalizes these costs (which it might partially do by decreasing transportation or possibly growing sustainably), then price of food will be higher, but the cost on human health or environment will be lower (Pretty 2005). To know how much of the cost of local food production is being externalized and how much food prices reflect real cost, the environmental impacts of the local system must be investigated.

Ecological Effects of Local Food

Agriculture has a wide array of impacts on the environment. It requires land to be cleared for planting crops or grazing animals, it leads to soil erosion, it can contribute to water and air pollution with excess nutrients or pesticides, and, a more recent concern, it contributes to climate change with emissions from land use, livestock, pesticide and fertilizer production, traction and transportation (McMichael 2000).

While local farmers may have a higher likelihood to use more sustainable practices since they have generally smaller farms and a more direct interaction with consumers, there is little evidence that this is the case. “Small-scale, ‘local’ farmers are not inherently better environmental stewards, although having fewer acres or stock to care for may make this more likely” (Hinrichs 2003). Farms that sell locally tend to be small, and small farms often raise a greater diversity of crops. But whether these farms use fewer pesticides, synthetic fertilizers or use water more efficiently is unknown.

There may be reason to think that local producers are more likely to raise their livestock in more sustainable manner—grass-fed, pasture-raised, or free range—since

these systems tend to be much smaller in scale than concentrated animal feeding operations. Their small size makes marketing to grocers and restaurants more difficult and local direct marketing more likely.

Grass-fed and pasture-raised animals are more sustainable than those raised in CAFOs by a number of measures. Animals in CAFOs require continual treatment with antibiotics and often hormones, which pass into manure and can contaminate groundwater and lead to antibiotic-resistant strains of bacteria harmful to human health (Burkholder et al. 2007, Sapkota et al 2007). In rotational systems animal manure is spread on the fields by the simple action of rotating to a new pasture, and toxic manure lagoons do not have to be created. CAFOs are also much more energy intensive. They depend on transportation of feed and lead to a net calorie loss as mostly corn and soy-based feeds are converted into animal protein (Pimentel et al. 2004). Grass-fed animals don't consume crops that are edible for humans but rather convert grass into food. Additionally, managing livestock using proper rotational techniques has also been shown to increase carbon content of the soil and has been proposed as a possible sink for atmospheric carbon to mitigate global climate change (Jones 2006).

Beyond production techniques one of the key reasons people claim local food is more ecologically sustainable is its shorter traveling distance from farm to plate (fewer 'food miles') and therefore it is assumed to have fewer carbon emissions associated with its production and transportation. One of the most ubiquitous statistics surrounding local food is that food travels an average of 1500 miles from farm to plate (Black 2008). This statistic came from a report from the Leopold Center for Sustainability, which measured the food miles for domestic food traveling to the central Chicago market. They found the

average distance was 1518 miles in 1998, an increase of 22% since 1981 (Pirog et al. 2001). This statistic, which notably does not include imported food, demonstrates how more and more food is coming from farther away. In the UK, a similarly globalized food system, they export 213,000 tons of pig each year, yet also import 272,000 tons, resulting in a large number of unnecessary road movements (Pretty 2001). Not all pig is equal, but reduction of these illogical and wasteful food swaps is surely possible. Proponents of a local food system argue that the reduction of such fossil fuel dependent transportation is essential to reduce green house gas (GHG) emissions, and that local food is a clear way to do that.

All things being equal, products traveling a shorter distance emit fewer GHG emissions, and contribute less to global climate change. Reducing food miles, therefore, generally will lead to a reduction in emissions, but there are exceptions that a more complex and accurate life cycle analysis (LCA) reveals. An LCA of food looks at the emissions during all parts of the food system, not just the transportation. The production of fertilizers and pesticides as well as the packaging, processing, and storage of food are large contributors to emissions. Such analyses account for the often months long storage of some locally produced food that would no longer be imported during the winter. The additional energy cost of refrigeration (or some other kind of preservation) must be weighed against transportation of fresh, but non-local products. Likewise, energy costs of local production of out of season crops in heated greenhouses must be weighed against importing non-local. For example, a study from Sweden found there were fewer emissions from transporting tomatoes from Spain than producing them locally in the winter (Carlsson-Kanyama 1998).

As a result of the complex and varying ways food products make it to the table and insufficient data on these channels, making accurate claims about whether or not local is more energy efficient than non-local is difficult, and many would say impossible (Edward-Jones 2008). Studies that compare local and non-local products come up with differing answers as to which is more environmentally benign and energy efficient. Even when studying the same product, they sometimes arrive at contradictory results. For instance Jones (2002) found it more energy efficient for the UK to consume UK apples than New Zealand apples, while Saunders et al. found the opposite. Jones is from UK and Saunders from New Zealand. Such a contradiction shows the difficulty of creating an accurate model of such a complex system. The outcome is highly dependent on how researchers decide to include or exclude parameters, decisions that are highly subjective (Edwards-Jones 2008).

Despite limitations, LCAs can show the areas of a life cycle where most emissions are created and where they can most easily be reduced. For example, since the contribution of transportation to GHG emissions of food is relatively small compared to other areas of production, Weber and Matthews (2008) found that the average American eating 22% less red meat and instead obtaining the same number of calories from chicken could achieve the same GHG reductions that a completely local diet would achieve. Buying local (in this study meaning zero emissions due to transportation) could achieve, at maximum a 4-5% reduction in GHG. And this assumes that local food has no transportation emissions, when in actuality local farmers' food emissions could be relatively high since some local farmers drive 200 miles one way to market and their volume of product is relatively small (Vaupel et al. 1989). Consumers too often travel

large distances or to multiple markets in an effort to buy locally, doing more driving than they would have if they'd just gone to a large supermarket. While the global food system may be transporting food long distances, it is often more efficient given the large volumes and potentially low impact methods like shipping (Singer and Mason 2006). The lesson of food LCAs is that while eating local food can reduce emissions, other consumer decisions like reducing consumption of conventionally-raised meat can potentially have a far greater impact (Weber and Matthews 2008).

GHG emissions eliminated by less transport must be weighed against other environmental impacts as well that cannot easily be expressed in terms of GHGs. There are times when producing food locally could put terrible stress on local resources that would counter any gains from decreased emissions. Just consider the amount of irrigation that would be needed to grow food in the arid southwestern U.S. Although local food might work in places like the Midwest, it is not something that would work everywhere for every crop, since our country has developed population centers dependent on cheap transportation.

Whether or not local has a greater or lesser impact on the environment is not straightforward. Local food might have fewer food miles, but might be produced or transported less efficiently. Local food may or may not correlate with organic or naturally raised, but perhaps allows consumers to influence farmers in that direction (Hinrichs 2003). Each case must be considered as a unique instance. And while eating local can reduce GHG, the contributions of transportation must be kept in perspective and not be overemphasized to the detriment of other potentially more effective ways of reducing GHG emissions from the food system.

So where does that leave us?

Taking a critical look at food localization we can see that its ability to counter the problems associated with the dominant existing food system are mixed and dependent on a host of variables such as affordability of market, location of market, the product, growing practices and method of transportation. While local food systems do not necessitate “enormous progressive societal changes”, they do offer a space where conscientious consumers can potentially make decisions that empower a community, support small-scale farmers with a just wage, protect animal welfare and preserve the capacity of the land to continue producing for future generations.

Perhaps the most dubious or difficult to verify claim of local food is its positive environmental impact. While the economic benefits to farmers are well documented, and the social effects, although potentially negative, are generally positive forces for building community and reconnecting consumers to farmers, considering environmental impacts there are many more questions. Are the small-scale farmers who sell locally less likely to till or use pesticides? Are they more likely to use cover crops and have greater crop diversity? In short, are they more environmentally sustainable?

Completely answering this question may ultimately prove impossible due to the insurmountable task of gathering sufficient data (Edwards-Jones 2008). However there are other important questions approaching from a slightly different angle that can indicate the ecological sustainability beyond merely quantitative data about emissions per apple. What is the attitude of farmers who sell locally towards the environment? How many grow organically? How do conventional and organic farmers view each other in the local

market and what are the trends towards more sustainable practices? While these questions cannot tell us about the most effective way to reduce carbon footprints, they do indicate the level of ecological consciousness among farmers and may suggest ways to create a more sustainable agriculture in future.

Farmers within the St. Louis Local Food System

As the previous sections demonstrate, there exists a considerable amount of research on farmers' markets. But there is room for more. As mentioned above, there is a need for more information about what particular methods of production are used by farmers who sell locally and the motivations behind these practices. Investigating farmers' attitudes towards the environment will give insight into what makes the local food system tend towards more or less sustainable practices. Even if more quantitative data proves difficult or impossible to collect, it is important to know what farmers perceive as part of good stewardship of the land. As such, I interviewed farmers on their marketing and farming practices as well as their reasons for farming and using particular growing methods. How do farmers think about care for the land and how do they differ in their views? How do the ways a farmer markets and grows his or her product reflect his or her attitude on sustainability? What constraints prevent more farmers from growing organically? Understanding the farmer's perspective may help to inform better policy and action to promote the transition to more ecologically sound practices.

The farmers markets in St. Louis City and St. Louis County were the pool from which sample farmers were drawn for this study. St. Louis contains a variety of farmers' markets and it offers the diversity of customers typical of a large metropolitan area.

Situated in the confluence region of the Missouri and Mississippi rivers and straddling multiple growing zones, the surrounding land is conducive to a wide range of products. It is an appropriate place to gather data on local food systems.

The Study Space: The Farmers Market

The farmers' market is perhaps the most prominent place where the local food system is enacted and thus gives a good approximation of what 'local food' means. It is the most common way that farmers direct market their products, and where consumers can go to satisfy any number of food preferences and values. They are dynamic spaces where consumers and farmers engage in a dialogue regarding food (Smithers et al. 2008). Their small size, and relatively small volume of food, limits what they tell us about the national food system, but their growing prominence and economic significance for thousands of farmers makes them important arenas where what constitutes 'good food' or sustainable food is being discussed.

Definition and history of farmers markets

A farmers' market is defined as "a common facility or area where multiple farmers/growers gather on a regular basis to sell a variety of fresh fruits, vegetables, and other farm products directly to customers" (Payne 2002). They vary in size ranging from a few to several hundred vendors. 28% of markets have fewer than 10 vendors but the Green market in New York City has 208 vendors (Feagan et al. 2004). Their products can be basic unprocessed foods or a wide range of value-added products.

Historically data on farmers' markets are lacking. This is largely because their numbers for most of the 20th century were negligible. There was a small increase in numbers during the Great Depression, but by some counts they had dwindled to only 6 in

1964, although others put the number at 340 by 1970 (Lyson 2000 p97). These numbers show the difficulty of getting accurate estimates, but even with low accuracy, it is clear the numbers at this time were very small. With the passage of Public Law 94-463, the Farmer-to-Consumer Direct Marketing Act of 1976 and new government support for direct marketing, the numbers of farmers' markets rapidly increased to meet the needs of the small farmer. PL 94-463 provided \$1.5 billion to support direct marketing efforts and was an important support for farmers who had not entered into the increasingly larger-scale system of food distribution. Despite criticism that such legislation was a step back in efficiency and would endanger the nation's food supply, it has been important in agricultural land preservation and limiting urban sprawl (Brown 2001).

The farmers' market, an institution that many thought was on the way out, was on the rise. After a leveling out in the 1980s, numbers of farmers' markets rose again in the late part of that decade and continue to grow today (Brown 2001). In 2009 there were over 5274 farmers markets, a 13% increase from the previous year. From 1998 to 2008 there was a 170% increase. Their numbers continue to grow at an extraordinary rate (USDA AMS 2010).

Why the increase in farmers' markets? Brown (2001) attributes the rise during the 1970s to PL 94-463 and government support for markets. Today the rising trend is different and credited to "producers' renewed search for more profitable alternatives to wholesale commodity markets", "consumer demand for fresh produce at reasonable prices", and increased interest in specialty foods (Hinrichs 2000, Atkinson and Williams 1994, Holloway and Kneafsey 2000, Hinrichs et al. 2004).

Current Situation of Farmers' Markets in this Country and St. Louis

Farmers' markets are receiving substantial support and now exist in unprecedented numbers. The 2007 Census of Agriculture reported \$1.2 billion in food sold directly from farmers to consumers, a 17% increase over the previous five years. Markets are also receiving more support. USDA secretary Tom Vilsac named August 2-8, 2009 National Farmers Market Week and the government has allocated approximately \$15 million for the Farmers' Market Promotion Program, a recent amendment to the Farmer to Consumer Direct Marketing Act, for 2009-2012 (USDA AMS). With greater numbers than ever, more sales than ever, more government support than ever, and more farmers depending on them to make a living, farmers markets have become an important, although still relatively small, aspect of the American food landscape.

In St. Louis and St. Louis County there are 13 farmers' markets. Of the 11 for which data was available, all but two were founded after the year 2000. Many also reported record numbers of vendors for their 2010 season. The St. Louis trend matches the national trend of extraordinary growth in the number of markets.

Farmers at Farmers' Markets

Farmers' markets can include both growers (full-time or part-time farmers and backyard gardeners) as well as non-growers (produce dealers and resellers). Sometimes a farmer will sell both her own and someone else's produce, becoming both a grower and a reseller. The average grower is small scale and sells mostly fruits and vegetables. Farmers come to sell at the farmers market for two main reasons: the economic benefits of the direct retail and the social interaction (Griffin and Frongillo 2003).

Small-scale growers have difficulty entering into wholesale markets and grocery stores because of the challenges of reaching the necessary volume, as well as meeting the size, color and uniformity standards (Payne 2002). Traditionally, farmers' markets have served as supplementary income to farmers. They could sell at farmers' markets early in the season before their volume increased sufficiently to sell wholesale, or they could sell at farmers' markets when wholesale prices were down. The ability to pick between multiple markets allows farmers to find the highest return on their time. (Brown 2001). Farmers' markets help farmers "even out cyclical cash flows, reassert control over production decisions" and make more money for their product (Feagan et al 2004). Since farmers' markets traditionally did not provide a large income, most farmers had other sources of income from other markets or an off farm job. However now more farmers (19,000 nationally in 2007) than ever are making a living off income from just farmers' markets (Brown and Miller 2008; USDA-AMS).

Farmers also go to market to enjoy the social interaction with other farmers and customers. The sense of community and break from the farm are welcome. In one study "A majority of vendors (62%) rated having a direct relationship with customers as their most important motivation for selling at farmers' markets, whereas more profit from farmers' markets was only rated most important by 36%, even though 68% of the farmers indicated that farming was their full-time occupation" (Hunt 2007 in Brown and Miller 2008). This result suggests that economic gain is secondary to social relationships with customers. However, Vougel (1989) found profit to be the main factor in farmers' decisions to sell at market. Either way, both the higher profits from direct marketing and

the social interaction are the primary motivations behind farmers' decisions to sell at local markets.

Methods used in this research

The outline of methods below draws on Griffin and Frongillo (2003) and Andreatta and Wickliffe (2002) who studied farmers at farmers' markets through interviews.

Recruitment for farmer interviews

Farmers markets' in St. Louis City and St. Louis County were found using the University of Missouri extension office's Missouri Farmers' Market Directory (<http://agebb.missouri.edu/fmktdir/view.asp?region=5>). After eliminating single farmer farm stands and defunct markets, there were 13 markets found in the two counties.

A list of 92 farms that sell at farmers' markets in St. Louis City and St. Louis County was compiled by consulting market websites and contacting market managers. Market vendors who were not producers or who sold inedible products such as soap or crafts were excluded and the remaining farms were randomized. Purposive sampling was not used because of lack of background information on farmers that would enable the researcher to pick a representative sample. Of the 40 farms contacted for the study, 13 farms were unavailable, 1 declined to participate, and 26 completed the interview. Conversations ranged from 6 to 45 minutes. Such variability was due to farmers' varying desire to talk and elaborate upon their answers. While some seemed in a rush and merely answered in the most basic of terms, others told ten-minute long stories to make a point.

Calls were made mostly in the evenings, but some which occurred at inconvenient times during the day may have contributed to the brevity of some interviews.

Because some market managers replied with a list of farms that had formerly sold at St. Louis markets, but no longer did, 3 of the 26 interviewed farms did not currently sell to St. Louis City or St. Louis County markets. These farms were you-pick operations, sold at other farmers' markets in the region, or had sales to restaurants, wholesale, and via a CSA. These farms are excluded from the marketing analysis in this research, but not analysis of their motivations, given their historic presence in St. Louis markets and similarity to other farmers.

Interview process

During January and February 2010, the researcher interviewed farmers using a semi-structured open-ended interview guide. The interview guide ensured consistency in topics but flexibility in responses. Overarching questions covered (1) biographical information of farmer, (2) Marketing practices, (3) Agricultural practices, and (4) Motivations behind these practices. See interview guide in appendix A.

All participants were briefed on the purpose of the study, assured of their anonymity, and offered opportunities to ask questions and comment. Verbal consent was assumed by continuation of interviews. Most farmers were open to conversation and wanted to talk about themselves and their farm.

Data analysis

Interviews were digitally recorded. Short answers were entered into tables and open response answers were transcribed. When interviewees diverged from the topic,

sections of the conversation were paraphrased. Codes were created for open response questions (Boyatzis 1998). Two-sample t-tests with ungrouped variances and Pearson's Chi-Squared test of two-way cross tabulation were used in analysis.

Limitations of this study

The semi-structured interview provides numerous benefits to the researcher, providing some degree of structure, but also flexibility and openness in responses. However there are also many limitations of this interview method. The consistency of a survey and its relatively straightforward data comparison is not possible in a semi-structured interview. The variety of interviewee responses and the more subjective interpretation by the interviewer make comparisons across the more subjective questions problematic. On the other hand, the semi-structured interview does provide the opportunity to ask some more objective questions about matters such as growing practices. However even then, responses can be affected by the interviewee's reaction to the interviewer. Overall the semi-structured interview was chosen so that there would be a certain degree of consistency across interviews and key topics and questions would be addressed, however farmers were also not limited in their responses and could expand upon their ideas, often offering rich insights that would have been lost in a survey (Flick et al. 2005).

Beyond the interview method, one must recognize that the information gathered is limited. Detailed economic data, or information such as productivity per acre, fell outside the scope of this paper. Self-reporting also presents problems as farmers might craft their responses to meet the supposed expectations of the researcher. Farmers might

cast their agricultural practices as environmentally benign, but without objective data, the validity of such claims is uncertain. For example, when asked about sustainability, farmers will emphasize any practice that might portray them in a positive light, such as the use of quail to decrease the amount of pesticide application. The emphasis on minor sustainable practices enables farmers to gloss over more significant detrimental practices.

With differing levels of knowledge and differing ideas about “the environment” or “sustainability”, efforts were made by the researcher to avoid such terminology. But give the nature of the questions asked it wasn’t difficult for farmers to pick up that the interviewer was gauging environmental impact through practices. This may compromise the specifics reported by farmers, but should not affect the fundamental, more objective responses to questions, such as “what pesticides do you use?”

Another limitation arose from the open response questions. Without a set list of suggested responses, farmers may have omitted some motivating factors that they would have mentioned had they been prompted. For example, one farmer cited religious reasons for farming on his website, but did not mention this in the interview. Despite the risk that potential motivations could be omitted from answers, the researcher chose not to present farmers with a finite list of possible motivations because he lacked sufficient knowledge to anticipate all possible responses.

Results

Table 1. Summary of Results	number	percent
Practices		
<i>Certified organic</i>	1	3.8%
<i>Organic practices</i>	8	30.8%
<i>"Alternative"</i>	13	50%
Why do you sell at local markets?		
<i>good price (retail price vs. wholesale)</i>	20	83.3%
<i>social interaction</i>	19	79.2%
<i>ensure quality</i>	6	25%
<i>size is prohibitive of larger market</i>	5	20.8%
<i>environment (fewer miles)</i>	1	4.2%
Why do you farm?		
<i>enjoy lifestyle</i>	19	73.1%
<i>tradition of farming</i>	12	46.2%
<i>started as personal garden</i>	3	11.5%
<i>food security</i>	2	7.7%
<i>financial/ to make a living</i>	2	7.7%
Why do you grow the way you grow?		
economic	10	38.5%
quality and taste	10	38.5%
environmental	9	34.6%
historical/tradition	7	26.9%
health	5	19.2%
convenient/pragmatic	4	15.4%
animal welfare (farms with animals)	3	37.5%
production	2	7.7%
religious	1	3.8%
Change in response to customers?		
products	17	68%
practices	1	4%

Characteristics of Sample

26 farmers were interviewed. 18 were men and 8 were women. Their ages ranged from 20 to 77 with an average of 50.2 years (the national average is 57.1 years)

and their time farming ranged from just 3 to 59 years (assuming those farmers who have farmed “all their life” started when 18 years old) (2007 Census of Agriculture). Eight were first generation farmers and at least three had farming families as far back as memory served. 15 produced vegetables, 9 had either orchards or berries, and 8 produced animal products which included dairy, egg, poultry, pork, beef, goat and lamb. The acres in production ranged from .5 for a small-scale vegetable producer to 900 for a corn and soybean grower with a side orchard. Farms employed anywhere from 1 to 12 people, usually family members. Of the 99 people employed at the farms sampled, 67 were family members (this includes the principal farmer). In two cases the farmer did not currently farm, but was in a managerial role because of age or the programmatic nature of the farm.

Farmers and Marketing Motivations

Of the 13 markets in St. Louis City and St. Louis County, the sample covered all markets except the Market on the Loop. The markets most represented were the Maplewood and Tower Grove markets where 8 and 9 farmers sold respectively. One farmer sold at a flea market in St. Louis, but was not planning on continuing this practice. Farmers reselling other farmers’ products were rare; only four resold and the volume was usually limited. Only three farmers sold exclusively at farmers markets and all three were very small-scale. Thirteen farmers had off farm income and thirteen earned their livings solely off the farm. The shortest distance traveled to market was 1.1 miles. The longest was 258 miles.

Responses to the question “Why do you sell at local St. Louis Markets?” were grouped into four main categories: The markets provided good prices (cited by 20 of 24 farmers), farmers enjoyed the social interaction of the market (19 of 24), farm size prohibited selling to other markets (5 of 24), and the market helped farmers to ensure the quality of their product (6 of 24). Only one farmer explicitly mentioned selling to local markets for environmental reasons. Other reasons included selling in farmer’ markets as a means to get rid of excess product meant for a CSA or home use. Half-price beer for vendors at the Maplewood market was also cited.

Practices

Only one of the farms sampled was certified organic, although another had been certified and had since failed to renew certification. Eight farmers reported that they used what would be considered to be organic practices, but chose not to certify, or for a technicality would not be eligible (for instance, having a stream running through the property). Farms fell within a range of practices from more conventional to more organic.

Responses to “Why do you farm?” were grouped into five categories: “enjoy lifestyle”, “tradition of farming”, “started as personal garden”, “security” and “financial/to make a living”. The 19 farmers who enjoyed the lifestyle of farming often cited the pleasures of working outside, being independent, and watching things grow. The 12 who cited the tradition of farming often had grown up farming and farming was “all they knew”. The 4 who mentioned starting as personal gardeners were generally motivated by the desire to grow healthy food for their families and then expanded to a

larger operation. Two mentioned that farming provided food security in an unpredictable world. Two said they farmed in order to make a living. However, many farmers sampled explicitly said that they did not farm to make money, and that if that were the goal they would do something else. This suggests that farmers who sell locally do so more because they enjoy the work or they feel it is the right thing to do, not because they want a high income.

When asked “Why do you grow the way you grow? How do you decide what growing methods to use?” farmers responded with a variety of motivations. The nine concerns identified by the researcher were economic (10 farmers), quality (10), environmental (9), historical/traditional (7), convenient/pragmatic (4), human health (5), high production (3), and religious (1). Of the eight farmers who worked with animals, three explicitly mentioned animal welfare as a motivation behind their practices.

Change for consumer demands

To meet consumer demand seventeen out of twenty-five farmers said they changed their products (cultivars of vegetables grown etc.), but only one changed her growing practices (to extend her season). The vast majority of farmers said that they had no need to change their practices, since they usually sold out or because customers supported their growing methods. A few explicitly stated they would not change or had even resisted change because they did not want to compromise their values or quality.

Data analysis

Grouping farmers into “conventional” and “alternative”

The researcher divided the sample into two groups in relation to their practices. One group, called conventional, used herbicides and pesticides that are not certified organic. The second group the researcher calls “alternative” for simplicity’s sake. This group used only pesticides and fertilizers that were organic certified and generally used more environmentally sound practices such as cover cropping. This group also includes those farmers who raise animals without additives like antibiotics or growth hormones in feed and graze on pasture or grass when possible. However, these farmers buy and use conventional feed because of the high cost and low availability of certified organic feed. While recognizing that there is a continuum of practices and many of the “conventional” farmers in this paper might identify as “alternative”, the researcher uses these terms to best differentiate between two broad categories of farmers in the sample.

Characteristics of conventional and alternative farmers

As would be expected, given the significant difference in age of conventional and certified organic farmers on the national level, significant differences were found between mean ages of conventional and alternative farmers, 57.8 and 43.3 years respectively (two sample t-test, $p=.023$, $df=23.978$) (Census of Agriculture 2007). Alternative farmers were also newer with an average of 18.3 years farming while the average conventional farmer had been at it for 35 years (two sample t-test $p=.022$, $df=23.738$). There was no significant difference in the number of farming generations between conventional (mean 3.9 generations) and alternative (mean 2.3 generations). 75% (3/4) of farmers who have farmed for 5 years or less farm alternatively. 71.4% (5/7) of farmers who have farmed for 10 years or less farm alternatively. 72.7% (8/11) of

farmers who have farmed for 15 years or less farm alternatively. This suggests that new farmers were more likely to grow alternatively.

The distribution of conventional and alternative farmers within type of agriculture was not constant. 8 of 15 vegetable producers grew conventionally. 2 of 8 farmers with animal products raised animals conventionally (but none in CAFOs). 6 of 7 orchards grew conventionally. So vegetable producers were near evenly split between alternative and conventional, farms with animals tended to be alternative, and orchards tended to be conventional. Sample size limited statistics on these subgroups.

When focusing on those who grow vegetables, but do not raise animals, there is not significant difference in age between alternative and conventional farmers. However for this same group there is a significant difference in years farming. Conventional farmers averaged 37.7 years, alternative farmers 11.7 years ($p=.018$, $df=7.4$). Size of land in production, which did not vary between conventional and alternative when all farms were sampled, was greater in conventional farms (mean 8.7 acres) than alternative (mean 1.75 acres) when comparing only vegetable producers (two-sample t-test $df=7.641$ $p=.004$)

The survey also found that alternative farmers were more likely to make a living solely off their farm than conventional farmers (Pearson Chi-square, $X^2=3.846$, $p=.05$).

Interestingly, there was a significant difference between conventional and alternative farmers when comparing the states they came from. Illinois had more conventional farmers and Missouri had more alternative farmers (Pearson Chi-square, $X^2= 9.905$ $p=.002$). This could be driven by the separation of products raised by state. 6 of the 7 orchards are in Illinois (this could due to the favorable soil type in that region),

and it happens that the only organic orchard is in Missouri. Orchards are extremely difficult to maintain with organic practices. On the other side, all animal producers who tended to be alternative in the sample, were in Missouri. Thus alternative animal farmers in Missouri and conventional orchards in Illinois drive this significant interaction.

Discussion

Nationally, most information about sustainable agriculture comes from the agricultural census data on organic farms. Results from this study resemble the censuses' findings about organic and conventional farmers. National information on organic farming shows the same growing trend that this study's group of alternative farmers does, with large percentages of organic growers starting in the last 5 years. Large proportions (44% nationally) of organic growers sold their products within 100 miles of their farm. This might suggest that organic farmers, such as those in this sample, also tend towards more local marketing. Organic farmers also had higher incomes than conventional growers, echoing the finding here that alternative farmers were more likely to be solely supported by farm income than conventional growers. The St. Louis farmers at farmers' markets were however more likely to be fully supported by their farm than organic farmers (50% in St. Louis sample, 18.7% of organic farms nationally) (Census of Agriculture 2007).

However, since the national agricultural census uses organic certification to measure the prevalence of sustainable practices, not the criteria used here to define "alternative", there cannot be a direct comparison between the census and this study. For

instance, there was only one organic certified farm in the sample, which puts the percentage of organic farmers lower than the national average. However, there were 8 farmers who claimed to use only organic practices, but just were not certified. Five alternative farmers said they would have become certified organic, but the cost was too high.

From these results it would appear that the local farmers could, on average, practice more sustainably than national and state (Missouri and Illinois) averages, however there is insufficient data to ascertain this claim because measuring the number of alternative farms using organic as a proxy misses all those farmers who practice organically but are not certified.

Marketing practices

Farmers' responses to the question about their motivations for selling at farmers markets concurs with other studies' findings that farmers' markets' greatest draws are the high prices and social interaction they supply (Griffin and Frongillo 2003). One further reason cited was that because of the small size of their farms, these farmers had few market options other than the farmers' market. Their size made it difficult to sell to grocery stores, or wholesale, because they could not meet the demand or make enough money selling at wholesale prices. Many farms, however, also sold to restaurants or through a CSA.

The top dollar consumers are willing to pay is the most important reason farmers sell at farmers' markets. Some farmers sold wholesale as well as retail, or had formerly sold wholesale, and emphasized the importance of selling direct to consumers in order to

make a living: "We need to either retail them to the people, or go out of business."

Farmers also would go out of their way to make it St. Louis markets where urban consumers are willing to pay much more than rural or small town consumers.

"St. Louis is a strong market, the money is good. People have better awareness of food issues."

Following closely behind economic reasons, the social interaction of the market was also very important for farmers' decisions to sell at the farmers market. Farmers often cited the feeling of positive recognition for their high quality products: "It's rewarding to sell to people you know who rave about your food." Farmers mentioned enjoying hearing people's stories and meeting folks from all walks of life at the market. As expected when interviewing farmers who sell at farmers markets, they enjoy social interaction; otherwise they would likely sell in another venue. That is, they are a self-selected group who take pleasure in interactions with people and are financially successful in the social marketplace. While one farmer said that high quality products sell themselves, many spoke of the need to have good social skills and actively engage with potential customers.

Since only one farmer explicitly mentioned selling at local markets for environmental reasons, GHG emissions or other environmental impacts are apparently not important to farmers' decisions about marketing. It is easy to understand why this concern is low on the priority list when half the farms are supported by an off farm income and their priority is to make a living. So while many farmers have a strong concern for the environment, and if asked might claim that local food has fewer food miles and therefore a smaller carbon footprint, their concern for ecological sustainability

is expressed mostly in the way they produce on their farm, not how they market. This seems in line with where environmental impacts truly occur since transportation externalities are less than farm externalities (Pretty 2001).

Motivations behind farmer practices: the organic/conventional debate

The inability to compare this sample of St. Louis local farmers to national statistics leaves us with a comparison within the sample between conventional and alternative growers. It is important to understand the motivations behind different growing methods so that the reasons for a rising trend in alternative ways of farming can be better understood.

There has been much published about the merits or flaws of organic and conventional agriculture. The debate has been heated and long, and it continues today (Fairweather et al. 2009). Here is not the place to go in depth on the issues, but many of the important rhetorical points of each side of the argument are discussed by farmers who sell at St. Louis farmers' markets. Issues such as health, ecological sustainability, and yield were frequently mentioned by farmers when referring to conventional in relation to organic or organic in relation to conventional. (Note: conventional farmers would call most alternative farmers in this sample organic. So in this debate organic is often synonymous with alternative). But interviews also provided a glimpse into the social relations between conventional and organic farmers and the factors that led them to their respective growing practices. Understanding these relationships and the path that brought farmers into their respective fields is important when considering the mindset that led

people to practice more or less sustainably and how to push agriculture in a more sustainable direction.

Firstly, most, if not all, farmers interviewed had a goal to produce healthy and high quality products. “Quality and taste” and “economic” reasons were tied for the primary motivation behind farmers’ growing practices and these reasons did not vary significantly between alternative and conventional farmers. All farmers believed that the ways they grow provide consumers with healthy, high quality food. Also, no farmer would say that his or her farming methods are “unsustainable”. “I don’t intend to not be here tomorrow” was a reasonable response from one of the conventional growers when asked about any sustainable practices he used.

However, the problems of conventional agriculture that concern many environmentalists are often problems that are difficult for farmers to observe. For instance, pollution of groundwater with excess nutrients affects people thousands of miles downriver, not the farmers who apply the fertilizer. The fossil fuel that goes into most parts of conventional production contributes to global climate change, a human-influenced reality that continues to be debated, questioned, and denied in public discourse. It’s understandable that many farmers do not recognize some of their practices as unsustainable given their small (but cumulative) contribution to global problems, that are invisible from their own farm.

Pesticides affecting yield and human health

When problems arising from the conventional farming paradigm are observable, such as pesticide resistance, farmers are much more concerned and aware. Pesticides can

have a strong impact on human health and crop yield as well as the broader health of the agroecosystem. Yet, despite common concern about pesticides among farmers sampled, beliefs about what types and their application were perhaps the greatest point of departure between organic and conventional fruit and vegetable production. Each farmer weighed a variety of factors in their decision to spray or not and what kind of pesticide they considered to be acceptable to use. Environmental impact, impact on human health, cost of pesticide, yield, and potential income from crop were all considered.

Conventional farmers often explained that they did not spray pesticides liberally because they are expensive and the high cost alone discourages excess. Many practiced integrated pest management and only sprayed when they needed to. Others had a more standard spray schedule, but all worked to maximize safety and health of food as well as yields. Dave, for example, always considers human health first when spraying, choosing which pesticide to use based on potency and time until harvest. Bill, commenting on the safety of conventional food, "I feel we've got the safest food in the world to be truthful. You don't know what other countries use."

Charlie, who grows primarily apples and peaches, expresses well the sentiments mentioned by other conventional growers. He is describing a typical farmers' market day and comparing his yield to an organic vendor's.

"...and you know I'll show up with, you know, truck loads of stuff that I picked and the guy a head of me he'll show up with, you know, three or four bushels of stuff."

He went on about another farmer growing organically who was hoping to get 2 pickings off his zucchini before the squash bugs destroyed the crop,

"I'm thinking... wow, you know all it takes is a little Sevin®... I know that's an insecticide and they don't use it but its not something I would call, you know, real potent or dangerous. I can pick, in fact last year, some of our first plantings of zucchini we picked on just about the whole season, and he's trying to get two pickings!"

He then mentioned the cost of organic and the safety of conventional vegetables.

"The problem with organic is it's expensive, is it that much healthier? I'm certified by the state too...I'm legal and safe."

Charlie defends his practices on account of the health of the food and his yield. If the FDA can inspect his product, then isn't it safe and healthy? Indeed nutritional differences between organic and conventional produce have been shown to be insignificant (Giles 2009). Doesn't it make sense to spray a little insecticide if that means the yield is going to be so much greater?

For farmers with orchards, many simply stated that it was impossible to grow organically, because the pests would destroy the crop.

“It’s nearly impossible to have an organic orchard, it really is.

Unless you want to hand somebody a peach with twenty moth holes in it.”

Yet farmers have experienced pests developing resistance and one farmer expressed fear about the power of new pesticides coming out, as well as concern about their cost. He would “love to sneak by with no spray” but sees it as necessary.

Sam, who grows organic apples, has difficulty with waste and blotches on the skin of his fruit. Consumers’ concept of quality is important when he sells his product. As one conventional farmer stated, “People these days don’t like seconds”, but Sam accepts surface blemishes so that he can spray less.

"I'm not going to spray all these organically-approved pesticides that are of a questionable nature, to make them [the apples] look more perfect...that's not my goal. My goal is to provide good healthy food and [have a] low impact on the environment."

The alternative farmers of the sample aligned generally with the organic philosophy. Sam, like other alternative farmers, is more concerned for the human health impacts of pesticides and decides not to spray even if it means their yield will be less or their crop might be blemished. These farmers are also more concerned for the health of the environment. They will spray, but often only as a last resort, favoring rotations or mechanical defenses against pests (e.g. agricon) to chemical ones. One farmer said she

would not put anything on her plants that she wouldn't feel comfortable eating herself (with the exception of manure).

The alternative farmers' concept of what is healthy is also different than the conventional farmers. What is acceptable to use and what is "natural" or "organic" varied across all farmers and within groups. On one side there is a conventional farmer who accepts using a chemical shown to cause cancer in laboratory animals, in order to help keep red delicious apples on the tree to reduce waste. For him the benefit to the farmer and consumer in increase in quantity of produce is worth what he sees as a phantom health threat blown out of proportion. On the other hand, there are some alternative growers who refuse to use even some of the certified organic pesticides because they feel they are "of a questionable nature", as Sam put it. There is a general tendency toward caution, "You don't know what these chemicals are doing to your body". Sarah, whose father was a conventional farmer and suffers from cancer, believes there is a strong chance his condition is linked with the way he farmed, even though she doesn't think it's possible to prove. Both groups of farmers, conventional and alternative, are trying to produce healthy products, but their idea of what is healthy and their skepticism about pesticides varies greatly.

Income

Beyond matters of environmental impact, human health, and yield, farm income is ultimately what supports one growing method over another. While alternative farmers no doubt are motivated by an organic ideology, the high prices they can get for their products are by no means insignificant. In the sample, 9 of 13 alternative farmers fully supported themselves from their farm income. For conventional growers the number was

only 4 of 13. There was a significant interaction between growing method (conventional/alternative) and whether or not the farmer had off farm income (Pearson's chi-squared, $p=.05$, $df=1$). Such a result suggests that despite the lower yields and increased work of growing organically, the farm income is greater. However, this should be accepted cautiously since actual income figures were not obtained and many factors, other than method of production, decide whether or not a farm is economically self-reliant. Furthermore, what one person might consider a satisfactory standard of living, might be insufficient for another.

The profitability of organic is evident. Nationally, organic farms had average annual sales of \$217,675 while all farms had sales of \$134,807 (Ag Census 2007). Large corporations such as Wal-Mart have recently moved to capture a piece of the organic market. There is clearly a demand for these products. However, this demand is missed by some of the conventional growers, "I mean this organic stuff, you just don't ...you don't...I mean it's a lot of work I don't know how they do it". Organic growers, on the other hand, see conventional methods as unnecessarily costly, "It looks to me like conventional farming is an expensive way to go. I mean I'm sure the argument would be the yields would be higher, but..." These discrepancies might be partially explained by the type of product produced. For instance orchards are very difficult to maintain without pesticides, but when raising livestock and certain vegetables, pesticide and synthetic fertilizer are hardly needed, if needed at all. Each farmer works within the system that they know, and the researcher is not claiming to know better than the farmer how to find his or her market. However, that the non-productivist model of alternative farmers is

financially supporting more farms than the conventional model focused on yields suggests a point worth considering.

The Rhetoric Between Alternative and Conventional

The relationship between conventional and alternative farmers goes beyond simple differences of practice. There is an underlying difference of values that came up during interviews and was often expressed by conventional growers who felt attacked by organics.

Here's Charlie again,

“Those organic folks, they're just another breed. I'm not knocking them. I mean they knock me”.

He went to a sustainable agriculture conference looking to find ways to minimize his use of pesticides, but,

"then they found I wasn't organic and then no one even talked to me...and I kinda got ticked off you know?....They think that what you're doing is wrong, but the fact is, if everybody grew organic, this world would starve to death, you know. I just don't think you can produce enough."

Dave also expresses this sentiment, “I absolutely resent the rhetoric!” For Dave the problem is the monopoly that organic has over terms like “natural”. When people criticize him for using “chemical” fertilizer he responds that everything is chemical and

therefore natural. Frustrated by consumers' lack of education about fertilizers, he mentions that Milorganite, a popular organic fertilizer, is made from Milwaukee's sewage sludge. (Dave claims Milorganite is contaminated with heavy metals, while Milorganite publishes that heavy metal content is below EPA exceptional quality upper limits ("FAQ: "I Heard Milorganite Contains Heavy Metals. Is That True?") He finds the organic industry's acceptance of sewage sludge fertilizer but not synthetic soluble fertilizers inconsistent. While Milorganite reuses waste and therefore would be categorized as a sustainable product, consumers concerned about health might have reservations. The point is that what is considered to be appropriate to put on food crops is not only a product of scientific research, but also the values held by consumers and farmers. For example, Pyrethum is an organic-certified pesticide, which Dave uses but doesn't call organic. He tells the story of a woman who uses it to excess and thinks nothing of it because its organic certification, whereas he believes an integrated pest management plan would be better even if the pesticide weren't certified organic. Setting aside important differences between organic-certified and non-organic-certified pesticides, Dave's point is a valid one, that organic products may be misused and can negatively impact health or the environment, which they were supposed to protect. As someone who concerns himself with quality and human health, he resents organic growers who he sees as following the letter but not the spirit of "organic".

Other conventional growers took a more ambivalent view towards organic production, "Well if you're looking for organic, I ain't against that at all, but you've got to grow something that you can sell and raise." Richard, a conventional grower, says he's

always keeping an eye towards sustainability and is very open about his growing methods which he describes as closer to conventional than organic.

Paths to Conventional or Alternative

When asked why they farmed in their particular way, many farmers simply responded, “That’s just the way you do it.” Often these were the long time farmers who had worked many years with agricultural extension offices and implemented the conventional practices proposed and supported by those institutions. One farmer called Illinois’ spray guide his Bible. These farmers trust in the university’s system to come out with the practices that will best serve their farms.

Alternative growers more frequently answered they grew in their manner for reasons such as concern for the environment or health. They were more often first generation farmers, and so came to farming with no previous experience. This newness makes them more likely to be concerned about the problems of conventional agriculture which they learned about before becoming farmers. Many who came of age during the rising influence of the environmental movement decided to be alternative growers. But there were also those who had switched from conventional to alternative agriculture after personally experiencing the negative aspects of the conventional system.

Farmers were also quick to point out, though, that their growing practices were also influenced by circumstance and chance, “I guess honestly if the first person I’d met would have been an organic farmer, I probably would have leaned that way, you know?” Who they happened to meet and who influenced their entry into farming had a large impact on whether they grew conventionally or adopted alternative practices.

What is the potential for transitioning?

The at times strained relationships between conventional and organic farmers resulting from ideological differences might make transitioning to more sustainable practices difficult for conventional growers. Beyond the personal factors, Hinrichs (2003) has noted that “other small-scale, ‘local’ farmers, hampered by age, disability, or growing economic marginality, may lack the awareness or means to follow more sustainable production practices”. But comments from growers who had already made the transition show that such a shift is not only possible but likely. Indeed, four of the sample (15.4%) had transitioned to alternative from conventional, and many had adopted more sustainable practices even if they remained generally conventional.

Witnessing conventional livestock production was most common reason farmers had shifted from conventional to alternative agriculture. It should be noted that conventional livestock production is very different than conventional vegetable or fruit production since it involves issues of animal welfare, and human health problems on a much larger scale. An important characteristic of the sample is that there are no CAFO operations, and those who raise animals focus on humane treatment and sustainable practices. The conditions of CAFOs are extremely controversial and one of the reasons consumers seek products from farmers’ markets.

Paul, who grew up on a conventional livestock farm but now raises grass-fed beef, commented,

"some of the things that I saw, I didn't quite understand and this seemed... this is the most, I guess you could say, sustainable and in sync with nature than anything else."

Simon, who also had experience working in the system of confinement, saw the system was not healthy for animals or the people working and determined something was wrong. Sarah, mentioned above, also characterizes this reaction against the conventional paradigm.

Beyond the stick of conventional agriculture's health or environmental conditions driving farmers away from CAFOs, the carrot of alternative agriculture's higher prices is bringing more conventional farmers to consider transitioning to organic methods. Paul mentioned working towards organic certification to capitalize on the market even though yields were lower.

"I am leaning that way in the future. I think that's what it's gonna come to because consumer demand. It is more labor intensive, and there's more waste but the public is willing to pay more."

Barriers to organic certification and more sustainable practices

Despite some farmers' desire to transition to organic certification and more sustainable practices, there are many barriers to doing so. First, when it comes to organic certification, one (imperfect) way of measuring ecological sustainability, many farmers cannot meet the required standards. Cost of certification in terms of dollars and time

spent making records aside, adopting organic-certified methods can be financially unrealistic for small farmers. For instance, organic feed is either difficult to find or so costly that small producers cannot afford to pass such high costs on to consumers who already pay prices well above what they could get in the average grocery store. Because of this, many alternative farmers in the sample support the conventional system with their purchases and therefore the use of pesticides and synthetic fertilizers.

Access to land can also be a constraint for sustainable practices. Paul, who above expressed his desire to transition to organic, said he was being held back by the cost of renting land during the transition period.

"In order to be pure organic you're not supposed to have anything on the ground for three years. And it's hard to rent ground for \$500 an acre and not do anything with it for three years. It's financially not possible."

Perhaps Paul could skirt this issue since he sells locally and could explain to customers that he's not certified yet, but is transitioning to organic.

Kim also is land limited on her farm. Her high level of concern for quality and health of her animals is partially frustrated by how much space she can give them. While not confined, the livestock has insufficient pasture to graze and be grass-fed. The cause is not Kim's disregard for her animals, but rather her neighbor's refusal to sell more land after previously agreeing to do so. She wisely acknowledges, "You'll never find the ideal

farm." Most often a farm is lacking an ingredient. Kim's missing ingredient is land, but she does her best within limitations.

Synthetic pesticide use also can prevent organic certification or more sustainable practices. All farmers with orchards recognized the near impossibility of raising a crop without pesticides, and the much-increased difficulty of growing organically with a reduced arsenal against pests. Yet even if they wanted to become certified as organic, some conventional growers said that their neighbors make it impossible. They are too close in proximity to non-organic certified sprays for certification. Or the pest infestation that they believed would result if they didn't spray, but their neighbor did, was enough to prevent serious entertainment of the idea because it would destroy the crop. Farmers therefore have to weigh the benefit of a larger crop versus the financial and environmental cost of pesticide. Such a complex calculation is important to consider, but difficult to answer.

When farmers do not see the benefits of sustainable practices they will abandon them. Six growers in the sample explicitly talked about their use of cover crops, but one grower saw no benefit and so stopped planting them. Other times more sustainable practices have not been developed enough to be viable on a commercial scale, for example no-till vegetable production. Such no-till production mentioned by one farmer in the sample would theoretically be beneficial for the environment by reducing erosion, but it is not a real option for grower trying to financially support herself because they wouldn't be able to achieve yields comparable to a tillage system. Ultimately, economic feasibility will dictate whether or not a farmer can adopt a particular practice.

Consumer impact on farmers' practices: a push towards sustainability or environmental apathy?

Consumers play a crucial role in the transition to more sustainable practices. Results from national surveys show that consumers have a general concern for the health of the environment. 71% would be willing to pay more for food if it meant that it could be produced in ways that protect the environment (Wimberley et al. 2003). But despite this willingness voiced in surveys, most Americans don't see agriculture as a major contributor to environmental degradation. Only 27% worry a great deal about environmental impact due to farming, 34% worry some and 25 % worry a little. 13% don't worry at all. Additionally, only 20% thought that farming was a major source of pollution in our nation today (Wimberley et al. 2003).

Surveys of consumer attitudes at farmers' markets show a similar pattern: a concern for the environment, but one that is relatively low compared to other concerns. In this study's sample, while 17 of 24 farmers changed the type of products grown, not one had yet changed his practices from conventional to organic due to consumer demand.

As noted above, consumers are concerned for the environment, but don't see agriculture as a serious contributor to environmental degradation. As a result consumers place other concerns above environmental ones and therefore are not pushing as strongly as possible for the transition to organic (Smithers et al. 2008, Miele 2006, Feagan et al. 2004, Connell et al. 2008, Andreatta and Wickliffe 2002). Instead of ecological sustainability, research suggests that the 3 most important reasons consumers buy local are the freshness, the quality of the produce (which often implies nutritional content), and

food origin (locally grown). Other factors include animal welfare, fair trade (person gets fair wage and treatment), and “naturally” produced. Appearance, certified organic, and packaging are all minimally important (Connell et al 2008, Smithers et al 2008, Andreatta and Wickliffe 2002). Consumers’ expectations of food bought at farmers’ markets did not often include organic or a “preferred production method”, a criterion that could correlate with environmental sustainability but also health, as in the case of irradiated eggs.

Interestingly, published research suggests that the most common question asked by customers to vendors is about “methods of production” (Smithers et al. 2008). This shows consumer interest in how the food was grown, but doesn’t show whether that interest is related to the sustainability of the methods. For instance they might be curious of how a farmer’s tractor works or what type of pesticides he uses. The different natures of these two questions are not distinguished when inquiries about “methods of production” are grouped together, and therefore more research needs to investigate the nature of questions consumers ask farmers.

But the practice (attempted above) of splicing apart farmers’ market consumers’ motivations into separate categories is difficult. Consumers’ willingness to pay for local produce is independent from just freshness and farm size, indicating there are many factors that influence customers’ decisions (Darby et al. 2008). Feagan et al (2004) suggest that individuals come to the market with complex combination of motivations that “may be more a product of internalized attitudes and values than overtly expressed choices.” This internalized attitude could be the basic desire to make “good” food choices (and at the same time buy high quality nutritious food). Such “good” food

choices likely contain an element of environmental concern, but this concern could get trumped by higher values such as “freshness” or “support of the local economy” when consumers are forced to pick one or the other.

In farmers we trust

The motivations that bring consumers to the farmers’ market are tied to their assumptions of what the market is. These assumptions rest largely on trust that the vendors of the market will provide the types of products desired by the customers. The general population strongly trusts farmers and sees them as largely honest, hard-working people. When compared to other groups involved in food policy (university professors, elected officials, and business executives), farmers are the people Americans trust most when it comes to ensuring food safety (Wimberley et al. 2003). Yet given the state of American agriculture, its negative impacts on the environment, and its historically doubtful protection of human health, farmers should probably be subject to greater questioning, rather than assuming that every friendly face behind the booth epitomizes all of the “good” values. In a space such as the farmers’ market, where communication between consumer and producer should enable a high degree of feedback, this is not happening as much as might be assumed (cite person about the ability of farmers to innovate). Consumers seem willing to trust that the farmers know how to best do their jobs (Smithers et al. 2008). When such trust characterizes interactions, there is the possibility that a consumer’s concern for the environment will be trumped by the social force of a smiling farmer. This is an interesting possibility that the farmers market makes possible: that the social interaction between vendor and consumer might lead to a *less*

sustainable purchasing decision. This would not happen at a grocery store like Whole Foods where consumers make decisions based on different labels and certifications, also imperfect indicators, but of a different sort.

On the other hand, the face-to-face interaction at the market means an increased transparency, which when consumers choose, can be revealing and a way to maintain integrity of the local brand within the farmers' market. Concerned consumers have access to the people who grew the food they are buying. They can ask all about growing methods if they want, or even go out to visit the farm. Such close interaction makes organic-certification unnecessary for most alternative growers because the customers themselves can verify the sustainability of a farm. As an example, at one of the markets in St. Louis County, a vendor was selling what he claimed was pasture raised pork, but when it was revealed that his pigs were actually confined, he was boycotted and forced out of the market (Froeb 2009).

Despite consumer interest in environmental sustainability and incidents of strong action by consumers against unsustainable vendors, in many cases consumers do not seem to be pushing farmers to transition as much as they might. In the sample many conventional growers didn't have any trouble selling out of their produce. As long as consumers do not push for more sustainable practices, then there's no reason for farmers to transition. Trust that buying at farmers markets means the purchase will be more sustainable no matter which vendor consumers buy from, and trust that farmers know how to do their job best, can potentially slow a move to more sustainable practices that are in line with the desires of consumers. More education at markets about the environmental impacts of conventional agriculture (both local and non-local) might help

to support current efforts by consumers to make local food sustainable in regard to all three pillars: not just social and economic but also environmental.

Conclusion

How to achieve a sustainable agriculture is unclear and contested. Local food has been proposed as an alternative system that would be more sustainable, but this claim is difficult to verify, especially when considering ecological sustainability. Recognizing the near impossibility of proving that local food has a lesser impact on the environment given the malleability of the definition and that conditions vary from place to place and product to product, this study focused on the attitudes and motivations behind the practices of local farmers in the St. Louis region.

Results show that the farmers who sell locally in St. Louis farmers' markets may be more concerned for environmental sustainability than the average farmer in the nation. There is a growing trend in alternative production as more young farmers grow using organic methods. The transition towards more sustainable practices appears to be occurring, but important barriers such as cost and product type (e.g. peaches) continue to stand in the way of some growers.

This study also revealed strained relationships between conventional and alternative local farmers. The mild animosity seems to develop from different values and lack of communication. All farmers valued high quality, healthy products, but conventional growers put more emphasis on yields while alternative growers were more cautious of potential health issues related to agricultural inputs. Whether or not farming

was the sole occupation of a farmer also varied across the conventional/alternative divide, with alternative growers more likely to support themselves from on farm income alone. Alternative production is profitable, despite potentially lower yields, and more young farmers are recognizing this, while simultaneously growing in a manner that aligns with their value of organic production.

Consumers also play an important role in the transition to a more sustainable agriculture, but studies suggest environmental concerns are not as highly valued as other factors such as quality and freshness. Current opinions about the environmental impact of agriculture and trust in the honesty of farmers as a group, suggest that consumer education may be needed to bring the impacts of agriculture to light and continue the transition to alternative production.

Many questions remain unanswered about the future of farmers' markets and local food. Stephenson et al. (2008) write about failing farmers markets that enter an inescapable downward spiral, unable to attract vendors because there are too few customers and unable to attract customers because there are too few vendors. The unprecedented growth of markets makes predictions extremely uncertain, and the rate of growth currently occurring will likely fluctuate.

The relatively small size of the local food system in comparison to the national and global system should not be overlooked. The trends in this paper are limited to a tiny portion of the overall agricultural industry, however they indicate a growing concern among some farmers and consumers in regard to the sustainability of their food choices. This study suggests that local farmers are indeed more often motivated by environmental concern than the typical American farmer, and discusses the complex motivations and

social relations among local farmers which influence the preferred method of production (conventional or alternative), thereby revealing potentially important ways to further push agriculture in a more sustainable direction.

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Appendix A: Interview Guide

Basic biography

- Are you the principal farmer?
- What is the year of your birth?
- What year did you start farming?
- How many generations has your family farmed?
- What is your farm's address?
- What do you produce on your farm?
- How many acres (or feet²) do you have in production?
- Who works on your farm? Hired help? Family?

Marketing

- Where do you sell your product?
- How long have you always sold there/in that way?
- How significant are farmers' markets for your income?
- Do you sell to non-local markets as well?
 - is local or regional market main source of income?
- Do you also sell products that another farmer grew?
- Do you hold other jobs/have off farm income?
- If you had to list the top three reasons you sold at local markets, what would those three reasons be?

Practices

- Do you have any certifications, like organic?
- How do you maintain fertility?
- How do you manage pests (disease and weeds)?
- If you do, how do you irrigate?
- What efforts do you take to conserve your soil?
 - cover cropping?
 - tillage?
- *if what they grow could be genetically modified*
 - *Do you plant any genetically modified crops?*
- *if farm has animals:*
 - What kind of animals do you raise?
 - How many?
 - how are they housed?
 - *free-range, non-confined, pasture raised?*
 - How do you use anti-biotics?
 - What kind of feed do you use?
 - *growth hormones, vegetarian, grass-fed?*
 - What do you do with the manure?

Motivations

- *If first generation farmer:*
 - Why did you get into farming?
- *If multiple generation farmer:*
 - Why did you stay in farming?

- Why do you grow the way you grow? Or how did you decide which growing methods?
- Have you adapted your products or your growing methods to meet customer demand?
 - What sort of change was this?