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Is Local Food in Your Future?: An Analysis of the Viability of the Local Food Movement

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Everyone needs to eat. Whether the food comes from a thousand miles away or the farm down the street, everyone needs to eat. In traditional society, farms were common. Today, the majority of our food is now grown far away and transported many miles before it reaches the final consumer. Many experts (Pollan, Bates and Hemmenway, Andrews and Urbanska) now argue that it would be more environmentally sustainable to eat food grown or raised locally. These experts and their followers comprise the Local Food Movement (LFM). Local food, while not universally defined is generally considered to be within a small geographic region with a shared identity, like a state or even a small country. Concern over distance is generally expressed in food miles, or the distance that the food travels between the point of production and the consumer. The greater number of food miles, the greater environmental impact the food is thought to have had because of greenhouse gas emissions (Carlsson-Kanyama 294). However, many others suggest that simply moving the centers of production closer to the consumers is not enough or would not create a significant difference (Coley et al).

In the face of such controversy, important questions about food production have to be asked. Food is a central part of life. Where are the best sources for our food? What impact does it have on the environment? Is this something that everyone can do? But most importantly: Is local food in your future?

BACKGROUND

History of Food Production

Food production has come a long way. For the majority of human history, we were hunter-gatherers. We traveled in small groups, finding what we needed, and moving on when it was gone. Approximately 10,000 years ago, plants and soon animals were first domesticated. Agriculture was born. Society changed completely. Populations no longer had to move around. The newly stationary lifestyle eventually led to the division of labor that allowed other crafts to exist. However, the majority of people were still farmers because they needed to feed themselves ("Origins"). As technology improved, yields improved slightly and distances that could be traded across increased. Farming operated in a nearly identical fashion until the industrial revolution (Cormer 1319). New tools were invented that dramatically increased productivity and decreased the amount of people needed to farm. Many Americans, and people all over the world, were able to move off of the farm, and into the cities (Pollan 34, Leblanc, Friedman).

America is often viewed as a land of plenty. This is because of the colonial introduction of plants and animals that could thrive with no natural predators.[1] Introduced items, such as honey bees and tomatoes, added to native foods and created relative agricultural abundance for early settlers (Cormer 1305). Despite such abundance, the food system was not nearly as productive as it is today. Productivity has been increased by several factors. The most significant improvements in food technologies have been in food preservation. Food had been preserved

since Roman times with pickling or cooking it with honey. The Mason jar, which made home canning of foods reliable and safe, was not invented until 1858 (Cormer 1316). The first tin cans were made a few years before that in 1849 and became instantly popular ways of packaging food. The most important invention was refrigeration, which developed first from ice boxes, appeared first in the early 1800s. Refrigerated rail cars were used to ship fresh foods hundreds of miles. This improved the diets of many Americans because while caloric intake had historically been optimal, nutrition hadn't (Cormer 1314-6).As refrigeration technology expanded, food and its nutritional value could be better preserved in shipping and eventually in homes (Leblanc).[2]

In the early 20th century, 25% of Americans lived on farms. Today, fewer than 2 million Americans (less than 1%) farm and they grow enough food to feed everyone else and parts of the rest of the world (Pollan 34). Industrialization turned food from a means of supporting oneself into an industry. The innovations of the Industrial Revolution could produce anything, even food on a large scale. The industrial economy's principles, namely specialization, standardization, and economies of scale, have been applied to agriculture increasingly since World War II. Most crops are grown in large monocultures and animals are raised separately. Production occurs on a large scale where it is cheapest (Neff 1588-9). Large monocultures are easier to manage, and are more profitable than a subsistence farm (Cormer 1315). This is related to the concept of economies of scale. This principle of microeconomics refers to the fact that producing things in bulk is more efficient than producing items on a smaller scale (O'Sullivan). For example, if you have a farm, big or small, you will need a tractor. Owning the tractor becomes more profitable the more food that is produced with the tractor. Farm equipment may be specialized so it is easiest to own only a few tools and produce only a few crops. Because of monoculture, today, the average American farmer is just as dependent on the globalized system as everyone else.

Agricultural interdependence is now the theme (Raymond 42).

Cost of Global Food

The great advances in food production have not come without a cost. Many argue that the global food system has become unwieldy, dangerous and most importantly is thwarting efforts at improving the relationship between humans and our environment. The average farmer can grow enough to support 129 eaters, but usually not enough to feed himself.[3] This is because modern farms grow one type of crop. In a system based on industrial agriculture and monocultures, even the farmers have to go to the supermarket. Pollan finds a sad irony in this fact. (Pollan 30). This is the cost of globalization.[4]

Current agriculture systems have changed the ability of the land they use to support large scale food production. Conventional agriculture relies on mechanization, monocultures, synthetic chemical fertilizers, pesticides and a philosophy which emphasizes profitability and productivity. However these methods are depleting fossil fuels and water supplies, and leading to a decline in soil fertility (Bates and Hemenway 48, Cunningham 165, 260). This is a dangerous situation. Infertile farmland with no water to irrigate it cannot produce food or support society. Additionally, the current food system may become prohibitively expensive due to rising oil costs (Bates and Hemmenway 42).

The globalized food system has also led to unhealthy people. It is blamed for the rise of many unhealthy diets (Schlosser). As more people pay attention to where our food comes from, perhaps more care will be given to its quality and content. Modern agriculture is blamed for disconnecting people from the land which has decreased the quality of life (Leblanc). Opponents of the current food system argue that the LFM can solve our problems by reducing negative environmental impacts and providing a social and economic benefit to local communities.

What is Local Food?

Local food is a new concept with many definitions that are still in flux. In 2010, the USDA released a report on local food systems in which they stated that the literature contains no agreed upon definition for local food. The best definition they found comes from the 2008 Farm Act which defines a local or regional agricultural product as one that has not traveled more than 400 miles or out of the state from which it was produced. It is the best because this is similar to the average of many definitions they found and it encompasses both the physical distance and state boundary aspects which people consider when they conceptualize local (Martinez iii). Four-hundred miles is significantly shorter than the thousands of miles food may travel within the current, global food system. The current distance is often cited at between 1500 and 3000 miles (Cunningham 155). Food miles, a term used to measure the degree to which something is local, is simply the distance that food has traveled from where it was produced to where it is consumed. Concern over food-miles is often expressed due to its impact on carbon dioxide and other greenhouse gas emissions. Also, consumers are demanding higher quality food, which many believe highlights the need for food systems grounded in local economies and ecologies (Coley 150).[5] Another argument used by local food proponents is that the global food industry is environmentally unsustainable.

Environmentally sustainable development is that which allows societies to meet the needs of today without damaging the ability of future generations to meet their needs. At a minimum this mandates that renewable resources not be used at a rate faster than they are replenished and that nonrenewable resources are used as responsibly as possible (Our Common Future, UN). LFM supporters argue that localizing our food systems would provide benefits in terms of fresher and healthier food, lessened greenhouse gas emissions via reduced food miles, and

provide food security in a changing climate.

LOCAL FOOD MOVEMENT

Forms

The local food movement takes several forms. The one most available to the average consumer is attempting to buy locally produced foods from their local supermarkets. Another form is Farmers Markets which are often held in areas with local farms. In 2009, the number of farmers markets held in the U.S had risen to 5,274 from only 2,756 in 1998 (Martinez 4). Farmers Markets are generally weekly or bi-weekly seasonal or year round events where farmers congregate to sell their products (Cunningham 178, "Farm Fresh RI"). They provide an opportunity for consumers to buy the freshest food they possibly can and to talk to the farmers.

Other than personally owning a farm, the most intensive form of participation in the local food movement is called Community Supported Agriculture or CSA. In a CSA, consumers pay a fee to support a local farm. Over the course of the year, all people who support the farm split the produce which grows on it (Hinrichs 39)[6] In 2005, there were 1,144 such organizations in the U.S. In 2001 there had only been 400. In 1986, there were merely two (Martinez iii). A case study of a CSA is Simmons Farm in Middletown, RI. The land itself has been farmed for 350 years. In 2000 Brian and Karla Simmons transitioned the farm into a certified organic farm and developed the CSA which is in its ninth season and helps feed 320 families. According to Brian Simmons, running a CSA has its benefits. It guarantees income and removes the pressure of needing to constantly have a farm shop open from the farmer. In their shares people get a variety of fruits and vegetables. Meat and dairy options are also available. One challenge faced by the CSA is seasonal eating. Simmons farm takes lengths to try to educate its customers on new ways of preparing odd items and storing methods. For example, they have held classes on what to do

with bok choy or how to safely can fruits and vegetables. The farm also participates in local farmers markets.[7]

Another example of the local food movement can be seen in local stores that specialize in local products. An example of this is the Green Grocer in Portsmouth, RI. The Green Grocer was started by John Wood and Aly Marks-Wood. It sells exclusively organic food and tries to maximize the amount that comes from local sources. Using New England as the parameter for local, as much as thirty percent of the food in the store comes from local sources. In addition to Farmer's Markets, stores like The Green Grocer are important outlets for farmers to sell their produce. They also are a way for people to purchase local and organic food at a place that resembles and could replace the more traditional supermarket.[8]

Lastly, some manifestations of the LFM bypass the traditional shopping relationship entirely. Programs like "farm to school" provide healthy, fresh, local food to many schools around the country. As of 2010, 14% of school districts participate in a farm-to-school program. In such programs, local farms provide food for the school cafeteria (Martinez iii).

Potential Nutritional Benefits

Many strongly believe that local food is fresher. It is rare to find an individual who has not had locally grown fruits or vegetables at least once and responds this way. Local food may have a positive impact on health because they are less processed and retain more nutrients. However, this is unclear as the link between distance traveled and nutrient levels has not been established. Focusing on consuming local food, may lead to healthier choices in one's diet over all. Anecdotal evidence suggests that membership to a CSA increases vegetable consumption (Martinez 46).

The change that nutrient levels undergo in produce while in storage has been examined.

The nutrients which are often tested for are ascorbic acid and antioxidants (Hounsome 173). In storage, broccoli has been shown to lose up to 70% of its ascorbic acid content (Podsedek). In many crops, ascorbic acid content is lost very quickly. In three days, 40% of the ascorbic acid content of green beans is lost (Favell). In seven days, 7-47% of flavonoid content in lettuce is lost (Dupont). However, in some studies conducted with tomatoes and broccoli, antioxidant content was found to increase during short-term storage (Leja). Kevers et al analyzed total antioxidant capacity in a wide sampling of produce and found that most vegetables lose appearance before they lose significant amounts of antioxidants. These studies suggest that nutritional levels in produce are highest immediately after being picked and drop significantly afterwards.

A study by Housome et al., examined the changes in various nutrients during the long-term storage of white cabbage. White cabbage is an excellent candidate for long-term storage because it goes through a dormant period (175). The study found that nutrient content fluctuates significantly over a six month period with both instances of decreasing and increasing at different times for different nutrients. There is a significant decrease in vitamin C over time, while there is a significant increase in vitamin D2. Most flavonoids decrease over the first four months, only to spike again in month five. All of these changes can be explained by processes occurring in the cabbage over the winter storage period that could also occur if the cabbage had not been harvested yet (Housome 176). This suggests that season that food is consumed may have a more significant impact on nutrient content than time since harvest.[9]

The LFM seeks to increase access to fresh fruits and vegetables for people of all ages. Programs like farm-to-school offer more exposure to information about choosing to eat healthy fruits and vegetables. The more children are educated about healthy foods, the healthier the

future is going to be, no matter the source of the nutrition (Martinez 46). Whether or not local food is actually healthier, people believe that it is. Shoppers at Farmers Markets generally believe that the food they are buying tastes better and is more ethically produced.[10] Additionally, in a survey taken of Salve Regina University students, 48% believe that local food is healthier. Twenty-four percent believe that local food is produced more ethically. Sixty-four percent believe that overall, local food is better for the local community.[11]

Community Impact

The local food movement is often seen as a possible way to restore a lost sense of community. Many LFM supporters feel that food of a higher quality is produced in a more natural way. This perceived quality is amplified if the food is produced locally (Winter 25). A study completed in the UK, asked many individuals why they felt supporting local food was important. The answers included "supporting local businesses", "supporting the local farmers", and "local shop has fresh vegetables and I feel we have to support it" (Winter 29). This is similar to data collected at a farmers market in Pawtucket, RI. Many shoppers were there because they "liked to support local growers", they just "feel better about it" and they feel like they are contributing to the local community (personal communication). Many also like personally knowing their farmer (DeWeerdt "Is" 6).

There are many examples of local food producers being closely linked to local charities. One of these is Harvest Kitchen. Harvest Kitchen connects local growers with at risk youth in Providence, RI who are in need of productive activities and marketable skills. Also, Amos House Works is a restaurant and catering company which buys local ingredients and supports Amos House, a social services organization. These organizations show that the LFM directly affects some aspects of the community[12].

Some skeptics have disagreed with movements that draw the boundaries of local at a state or country. Hinrich argues that "fractures between the spatial, the environmental, and the social feed into the sometimes contradictory politics of food system localization" (36). This comes into play when one considers the definition of local. If local is vehemently defined as just Rhode Island, food from southern Massachusetts, which may geographically be closer, is no longer local. Hinrichs warns of 'food patriotism' in which the local is privileged in opposition to destabilizing forces or a global other (37). In this case, globalization would be viewed as a destabilizing force. Hinrichs warns that in an effort to spite globalization, people might favor certain foods even if there is no scientific or practical reason they would be better. Michael Winter also writes about defensive localism and how it relates to food. He argues that the local food movement is more about protecting local economies in a changing economic world than protecting the environment (23). He says that while quality is coming to be seen as inherent in local food, this is not based on anything in the local ecologies. Quality, other than nutritionally, is often socially constructed and can be measured in various ways. Aspects such as healthy, authenticity, tradition, and taste are all subject to change, depending on the framework (Winter 25).

The LFM can be viewed as a response to globalization. Due to globalization, the world has become much more connected, but the identity of individual areas can be lost. Many movements that call attention back to the small scale identity have arisen in response to this. Giddens gives the resurgence of local nationalisms in places such as Quebec or Scotland as examples (Giddens 31). This is one of the explanations for why many complain of a loss of community in the modern era. The search for community ties via the LFM is similar to nationalistic movements because it returns focus to a smaller locality.

Food Miles

The hallmark of the global food industry is well-traveled food. Refrigerated railcars have been instrumental in food distribution (Cormer 1314).Today food is shipped by truck, train, ship, airplane and other means. All of these have one thing in common; they burn fuel to get our food to us, releasing ever-increasing amounts of carbon dioxide into the atmosphere, contributing to global climate change.[13] One's carbon footprint is the amount of carbon dioxide that they personally contribute to the atmosphere. LFM supporters argue that the best way to reduce personal carbon emissions is to decrease food-miles.[14] Additionally, choosing local food over global food is one of the few opportunities that the consumer has to lower environmental impact with an easy personal choice (Weber 3508).

Greenhouse Gas Emissions and Peak Oil

In addition to GHG emissions, the distance which food travels causes problems for the locations where it is produced. A significant cause of environmental change is deforestation. One of the many underlying causes of deforestation in developing countries is the production of cash crops and timber for Western countries such as the United States. By importing such items from nations which could be using their limited cropland to support themselves, developed countries increase environmental degradation in these areas that we otherwise view as insignificant and far away (Geist 147).

Another argument against global food says that we are in an increasingly precarious position due to the eventual depletion of oil and impending climate change. Should the climate change as the International Panel on Climate Change predicts, raising the global temperature by approximately five-degrees Fahrenheit (IPCC), the global food system would be in a very dangerous position (Friedman, Hemminger). It is not known exactly where the best agricultural

lands would be, and there would be severe famine before we figured in out again (Liotta 173, Friedman, Hemminger, Brown). This is due to compounding threats of not only temperature change, but soil erosion and increasing desertification (Brown 93-96). In the face of such unpredictable change, a decentralized system would be easier to protect and adapt (Hemminger 33).

Additionally, LFM supporters fear how much food production system is reliant on oil. They argue that when oil runs out, famine will be more common and food prices will skyrocket (Neff 1590, Cunningham 168). Discussion centers around the idea of peak oil, and the fact that if we are past this point, prices will eventually become far too high to continue on with globalized food (Neff 1587). Peak oil is the highest level of oil production that could ever be reached. In 1956, M. King Hubert predicted that oil production in the U.S would hit its highest level in 1970 (Brown 29). A Pentagon report is cited as saying that by 2012, all surplus oil production capacity could disappear entirely and as early as 2015, consumption could outstrip production by as much as 10 million barrels a day. This creates problems (Hemminger 30).

Agriculture is an oil intensive process. Petroleum is involved in nearly every aspect. Food production uses oil in farm machinery operation, transportation, pesticide application, irrigation, and managing waste. Food processing and packaging involves petroleum in processing techniques, plastics and other packaging and some food additives. Obviously, food transportation involves petroleum via fuel for planes, trains and trucks (Neff 1588). Modern agriculture in the United States consumes 16% of the energy we use. David Pimentel, of Cornell University calculated that each hectare of corn uses the equivalent of 5 barrels of oil (Cunningham 168). If oil is being depleted, our whole food system needs to face some changes, not just the transportation aspects.

If such trends continue, many argue that we will be in serious trouble (Andrews and Urbanska, Neff, Hemminger, Norber-Hodge et al). Eventually, we may face prohibitively high prices on items like bread or milk. Therefore, if only one part of the food system is localized, it has to be the staple food items (Hemminger 30-32).The LFM argues that by localizing food production, we better protect our environment and ourselves from a changing future.[15]

However, the hype surrounding peak oil may be unwarranted. Lomborg argues that concern over remaining oil surfaced in the 1970s during the OPEC oil crisis which had nothing to do with remaining amounts of oil. Instead, it was an economic strategy employed by OPEC (Lomborg 119). Therefore the concern is not a lack of oil, but a lack of affordable oil. However, there is abundant evidence that oil supplies are limited. At current rates of global consumption the remainder of proven oil sources would last 41 years. If the United States stopped all imports of oil today, remaining domestic supplies would last 4.2 years. (Cunningham 296-7).

Given the limited amount remaining of a non-renewable resource which has become the foundation of our everyday lives, one would assume that transitioning away from oil would be an immediate priority. A main source of the complication is the instability of oil prices. In 1993, oil cost only $15 per barrel. In 2008, oil had gone up to more than $150 per barrel. The constant fluctuations of oil prices make establishing any policy or conservation practices very difficult. When oil is expensive people will lobby for renewable energy and change their lifestyles. But, when oil prices drop, the old ways of operating are quickly resumed (Cunningham 297). Skeptics of the idea of peak oil are not concerned. Part of this is driven by confidence that we will find better ways of powering our lives before the oil becomes unobtainable. Sheik Yamani, Saudi Arabia's former oil minister and a founding architect of OPEC is quoted as saying, "the Stone Age came to an end not for a lack of stones, and the oil age will end, but not for a lack of oil"

(Lomborg 120).

FLAWS IN LOCAL FOOD

The LFM addresses significant concerns about globalized food production and the future of food. It proposes a way of life which could save us from many potential environmental problems we are facing today. However, the LFM is not without flaws and it is not the only solution. The LFM lacks an agreed upon definition, suffers from a false-nostalgia, is economically infeasible, and does not reduce emissions as much as it claims.

Lack of Definition Consensus

There is little to no consensus on the definition of local in regards to the LFM. The closest to an official definition available comes from the previously cited USDA report that found on average that local food refers to food produced within a 400 mile radius (Martinez iii). Other than that, disagreement is rampant. The popular book *The 100-Mile Diet*, obviously uses 100 miles as its limit. In some places, the definition of local seems to stem from a kind of food patriotism as it advocates eating only foods produced in the same state or country that they are produced in (Deweerdt "Is" 2).[16] Some people speak vaguely and just advocate for bringing food closer to home, without specifying how close. Instead of making a clear definition and sticking to it, others suggest a "near and far" policy, meaning that one should localize food as much as possible and then get whatever absolutely needs to come from the tropics, from far away (Deweerdt "Local" 5).[17]

Additionally, local farming is often assumed to be sustainable or organic. This is simply not the case. While there may be slightly more social pressure to have environmentally sound business practices, a local farm is a business just like any other and faces similar pressures to do things the most efficient way possible. Which, in many instances, may mean that food the

consumer thinks is organic or environmentally sustainable, isn't (Winter 30).[18] In an interview with John Wood, he revealed that sadly, he has to turn away local vendors because they often don't meet the organic requirements he has for his store[19]. This is what Hinrichs warns about when she speaks of food patriotism. This may lead to beliefs that food is better for reasons when it's not (Hinrichs 37).

Lack of Impact of Food Miles

In addition to having definitional issues, the concept of food-miles, as popularized by the LFM, does not have the impact they claim it does. Food mile is a term coined in the 1990s to express the distance food travels between production and the final consumer (Webster 3508). It has perhaps played an important ideological role in getting people to understand where their food comes from by increasing awareness of the steps of food production that occur before purchase at the grocery store. Focusing on the actual distance between food production and consumption led to an increased push for localization. However, many argue that it is time to move on because it obscures other source of greenhouse gas emissions (Coley 154). There are many obvious reasons that focusing on food-miles is not effective. Many who argue for localization argue that each item traveled across the country to get to the individual consumer in order to motivate the consumer to change. They sometimes omit the fact that this item was not the only one on the plane, train, truck or boat. There were perhaps thousands of items that each shared the food-miles and carbon dioxide emissions in the trip. The actual emissions per each individual item are very small. If a shipment of 1000 items traveled 1000 miles, each item would have the equivalent of merely one food mile. [20]

In some cases, localization may not significantly lower carbon emissions at all. Coley et al compared a big box food shipping system in which boxes of food were delivered directly to

the consumer from the globalized food system to a proposed localized food system. They found that if the consumer drives more than 6.7 km or 4.2 mi to a local farm shop, the mass distribution system is more efficient in terms of greenhouse gas emissions (Coley et al 152).[21] This has applications even where the big box system is not in place. In an urban area, the commute to a local farm store is likely to be much longer than the one to the local supermarket. Therefore in most cases commuting to a local farm store is less efficient and represents the localized food system proposed by the LFM. The latter is the current globalized food system.

Additionally, the LFM's food-miles argument disregards the production phase and any transport upstream of the farm (Weber 3508). Decreasing food-miles does not significantly affect the extent of the food industry's impact. Food-miles contribute 11% of the greenhouse gas emissions involved in the production of fruits and vegetables and only 1% in the production of red meat. If food-miles were to theoretically be reduced to zero, it would have the same effect as the American diet containing 21-24% less red meat (Weber 3512). So, if goal is to reduce GHG emissions by the amount that could be accomplished by the LFM we have two options. Restructure the entire system; or, reduce red meat or other high impact food consumption.[22]

When envisioning the option of restructuring our food system, LFM supporters imagine a return to a simpler way of life. Many supporters aim to reclaim a lost agricultural heritage which according to Hinrichs is good but one should use caution. We should avoid letting "local" become a proxy for good and "global" become a proxy for bad. This practice only furthers confusion of terms like "local" with "organic" or "sustainable" (Hinrichs 34-35).

Diet Complications

One major complication for those seeking to eat local is that not all of the food that is customary in the American diet is available year round. An example of this is the tomato. In

recent years, markets have become accustomed to year round tomato availability. This is accomplished through a combination of greenhouse and field tomatoes grown in various parts of the US, Mexico and Canada (Cook and Calvin 2). Our ability to do this has yielded one of the more diverse and nutritious diets that has existed in history (Cormer 1316).

There are costs associated with extending growing seasons. Greenhouses require a large start-up cost and maintenance that field crops do not (Cook and Calvin 4). However, this helps address issues of what's available in the winter. Many items that are available during the winter due to cold storage techniques may have lost or changed in nutrient composition since the time of harvest. Many local farms, such as Simmons farm address the issue of eating seasonally by teaching skills that have been lost due to convenience. Canning fruits and vegetables has resurged. Simmons farm, and surely others across the country, offers their customers recipes for how to cook what's available in the winter.

Myth of Perfect Farm Life

Additionally, our well-fed, well-balanced agricultural history is mostly a myth. A consistently balanced nutritious diet is a fairly recent invention. In the past, many, especially the poor, may have gotten enough calories, but not enough of essential nutrients. It was not until milk or other foods were available in canned form this problem was solved. Kathleen Ann Smallzreid is quoted as saying that "refrigeration probably did more to change the flavor of the American meal than any other invention and in doing so it brought health as well as enjoyment to the table" (Cormer 1315). Refrigeration is a fairly modern invention. Without its use in food transportation, the level of nutrition we receive from our food would be worse.[23] Also, many proponents of the LFM often believe that in the past man lived in harmony with his environment and that a return to those ways would decrease environmental degradation. The past that many

would like to go back to, simply never existed. There is no evidence to suggest that humans ever lived in perfect balance with nature. Religious practices or any other custom does not guarantee that an individual or a group will be able to act in perfect long-term ecological balance. According to Leblanc, research has shown that none of the proposed social behaviors that would have served to regulate human populations in the past actually did so (Leblanc 25).

Other GHGs in Agriculture

Other than those in the transport phase, the greenhouse gasses produced by agriculture are entirely unaddressed by the LFM. The only gas for which it accounts is carbon dioxide. While carbon dioxide is a significant portion of all greenhouse gas emissions, agriculture only accounts for 8% of all carbon dioxide and only negligible amounts of the greenhouse gasses is carbon dioxide. Agriculture does account for 30% of methane and 76% of nitrous oxide emitted (Siikamaki 40).[24] Methane is 20 times more effective at trapping heat in the atmosphere than carbon dioxide ("Methane" epa.gov). Because of its long atmospheric lifetime, nitrous oxide has 310 times the heat trapping potential of carbon dioxide. While their emissions are not on par with carbon dioxide, nitrous oxide and methane together make up 13% of all greenhouse gas emissions when placed on a carbon dioxide equivalent scale (Siikamaki 38-40). This may not seem like much, but changes in food production practices could do much more to prevent methane and nitrous oxide emissions than carbon dioxide. Nitrous oxide emissions could be reduced through more efficient or moderate uses of manure (Cunningham 168). Methane is slightly harder to control because a source of it is the digestive systems of cows. However, methane from manure can be captured and burned as a source of electricity to power the farm (Siikamaki 40). Despite the production of a limited amount of carbon dioxide, because of the potency of methane, the process still results in a significant reduction of greenhouse gas

emissions (Siikamaki 42, “Methane” epa.gov).

Economic Issues

The LFM oversimplifies many economic problems that would arise in changing our entire food system. Primarily, locally grown food may be prohibitively expensive for many (Kaufman). Stores like Walmart exist for a reason. Many people can only afford the cheapest products. The centralized, global food system means that food is produced in mass quantities where it is cheapest (Neff 1589). The current production methods are often the cheapest due to Federal Farm subsidies (Brown 146)This is not necessarily possible in a localized food system. Stores like Whole Foods which frequently carry local products have significantly higher prices and are not an option for the poor.[25]

Price data from the Winter Farmer’s Market and the Stop and Shop on Bellevue Avenue in Newport, RI were compared. It was found that while some prices were comparable, the supermarket was generally more expensive. Potatoes were $1.30/lb at both locations. However, 1 dozen eggs at the farmers market costs $4.50, at stop and shop it costs $2.99. A bag of salad mix is $15/lb at the farmers market but is less than $5 at the supermarket[26].

The potential higher cost of local food exacerbates an issue already faced by the poor. A study by Kaufman et al. examines the issue that in many circumstances, the poor already pay more for food and have to employ more creative cost saving measures. This conclusion comes from the fact large supermarkets with cheaper prices are generally in suburban areas. However, poor populations are concentrated in urban and rural areas, where food prices are generally highest. The study suggests that the poor cope with higher prices through buying lower quality food in bulk. This explains the statistic that in 1992 the poorest 20% spent $1,249 per person on food and the wealthiest 20% spent nearly $2,000 per person on food (Kaufman iv).

The LFM appears to work well for areas that are currently agricultural. One study in southeastern Minnesota found that if people in the area bought 15% of their food from local sources it would generate two thirds as much income as federal farm subsidies. However, no new jobs or net income is generated in this process. It is only shifted away from areas which could potentially suffer loss due to shifting the money around (Deweerdt "Local", 2). Subsidies are only moved from one location to another. While everywhere is local to someone, this still creates problems. One problem is that of the local specialty market. For example, a Marin county in California is known for its artisanal cheese. This specific cheese can only be produced in this area but the area could not support the entire artisanal cheese market by itself. If all food were local food, specialty markets like this would die (Hinrichs 36).[27] Lastly, current means of localization are not working as well as LFM proponents would hope. An example of this is the case of CSAs (Community Supported Agriculture). Consumer participants support the producer by paying for their share in advance of the season. They receive a weekly basket of high quality local farm foods. However, membership to a CSA is expensive and only viable to a small percentage of the population. For example, the fee for a share of fresh organic vegetables to feed three to five people from Simmons Farm in Middletown, RI is $605 for the 2012 season. For this fee, the family receives a share of vegetables once a week for twenty weeks, June 11th-October 22nd. Additionally, an analysis of CSAs in Iowa reveals that they are economically precarious or are subsidized significantly by a conventional commodity enterprise or off farm income (Hinrichs 39). They are not self-sustaining as of yet, and without change, will not represent an improvement to the globalized food system. So far, the LFM does not propose an economically sustainable change to our food system.

HOW TO MAKE LOCAL WORK

Given that the LFM poses some serious questions about the future security of food, it cannot simply be ignored. This means that instead of continuing on with our globalized food system, it has to at least be considered whether some aspects of can be replaced in favor of more local systems.

Modifying Ideas of Local

Many supporters of the LFM are willing to concede that not everything can be local. Kingsolver writes in her book *Animal Vegetable Mineral: A Year of Food Life*, that her family made one basic exception in their year of eating locally, coffee (Kingsolver 340). Additionally, there are very few if any local wheat growers and flower mills. Local bakery owners justify their place in the LFM with the fact that at least the breads and pastries were made locally, with the best quality ingredients they could find.[28]

Economic Assistance to Poor

Shoppers at farmers markets state that while the prices they are paying may be more expensive, they feel that the difference in quality is worth it.[29] However, for the many who have difficulty affording enough food without the increased price, some Farmers Markets have an answer. Through Farm Fresh RI many farmers markets are able to accept foodstamps/EBT cards. When a shopper comes through with an EBT card, they swipe it for a certain amount of tokens that don't expire and can only be used on food items. They receive a 40% bonus.[30]

Additionally, work is being done to show consumers in which cases the farmers market can be less expensive than the supermarket. Current flyers from Farm Fresh RI and similar organizations demonstrate to consumers how to best use their money at the farmers market. They compared the price of potatoes, squash, apples, onions, oranges and grapefruit at a farmers market, at Stop & Shop, and at Whole Foods. For most items, the farmer's market price was

found to be cheaper than either the Stop and Shop or the Whole Foods price. The only exception was oranges which was more expensive at the farmer's market (Ringleheim). This is likely because the prices are from January and the global food system has methods in place to get inexpensive oranges which the local food system does not have.

Urban Age

The LFM is a response to the highly centralized and globalized food production system. Change is being called for in food production, power generation and everything else. Decentralization is the theme of the proposed changes. DeWeerdt asks an important series of question which all essentially lead to the same thing: Where will the land (resources, people, industry) to feed us all locally come from?

Before the Green Revolution, there were concerns over whether or not there would be enough food to feed the growing population.

To answer this, some look to the capabilities of urban agriculture. Kirsten Larsen argues that change will occur when we start seeing cities as productive, rather than consumptive spaces. Large scale animal production will likely never occur within cities, but there is large potential for the growth of fresh, perishable foodstuffs, especially fruits and vegetables. Organic waste and water waste can be used to help close agricultural production loops (Sullivan 18). There are many ways to do this.

There are many popular forms of urban agriculture. The most common is community gardens in which open spaces in cities are turned into productive spaces. In addition to food, these spaces increase cohesiveness in communities through educational and outreach programs and volunteer opportunities. Also, they add value to areas because they often transform an abandoned lot into a much nicer area (Sullivan 153). Another form of urban agriculture is

hydroponics. Hydroponic agriculture is the growing of plants in nutrient rich solutions or moist inert material instead of soil (Jones 5). With proper equipment such a system can yield a high volume of produce. [31]

A successful case of hydroponic agriculture is Finger Lakes Fresh in Ithaca, NY. It was originally developed by Cornell University as a research project in the area of Controlled Environment Agriculture to grow produce in New York all year long. This greenhouse has shown that lettuce can be produced year round and that there is demand for it. What was once a small research project has developed into a successful company, generating revenues of over $600,000 a year ("About us").

A related solution is the vertical farm. A vertical farm is a method of farming indoors in a multistory building which can be envisioned to be akin to several greenhouses stacked one on top of the other. According to Dickson Depommier, vertical farming is the way of the future for providing food in urban spaces. He says that this is important because 8 million people who live in New York City require a land mass the size of Virginia to produce their food. As urbanization increases, this will not work. Therefore, something has to change and a potential answer is the vertical farm ("vertical farm").

There are also more efficient pathways which can be used to produce the food we need. Brown suggests that to feed the planet, we ought to look towards aquaculture. There are many different forms of aquaculture. The most common rely on herbivorous species like carp, catfish and tilapia. Other forms also include different ways of mimicking natural food chains by having different kinds of fish that feed on different levels of the food chain. Others find ways to link aquaculture to agriculture by using agricultural wastes like manure to fertilize the ponds. Brown also suggests improving the efficiency of protein production by increasing the amount that

soybeans are incorporated into animal feed. Lastly, he suggests that we move down the food chain and that we adopt a diet closer to the Mediterranean diet. Such a diet includes meat, cheese, seafood and other things, but all in moderation (Brown 187). None of these methods include food localization but are merely ways to put less energy into producing more food; which is something the world needs.

Therefore, there are ways to address many of the concerns which people have. If the local food cannot accomplish all change on its own, then perhaps it can be supplemented with other ways of changing life styles. If the basic frame work of globalized food is here to stay, the lessons and concerns of the LFM can certainly provide ways to temper the impact that it has on the future of the world.

CONCLUSION

The question, "Is Local Food in Your Future?" raises several important inquiries into the state of our food system today. It is agreed the global system of food distribution is largely unsustainable and is causing great harm to the natural resources which sustain food production. It is also evident that the transition to Local Food is not necessarily an easy, inexpensive or clearly better one. However, something must be done to improve the state of food production and distribution.

The Local Food Movement demonstrates that we can get fresh produce that stimulates business in our local economies. It also shows that people who pay enough attention to their food to eat as local a diet as possible can live healthier lives. By applying some forms of the Local Food Movement to our lives, we will be able to diversify our food sources and solve some serious problems the system we live with today. So, in answer to the question which plagues the minds of many in the world of food today, yes, local food is in your future.

END NOTES

[1] This concept is referred to as ecological imperialism (Cormer 1305). Ecological imperialism is essentially the positive and useful side of introducing non-native species that have potential to become invasive (Primack).

[2] Other significant improvements include the introduction of hybrid seeds that increased yields for corn and other plants. Additionally, industrialization brought more advanced plows that reduced the amount of labor required per plant (Cormer 1314).

[3] This statistic is derived from the fact that each the farmer to population ration is about 1:129. The farmer, by himself, is not literally feeding 129 people.

[4] These gains include the ability to get fresh food year round and having exotic produce and meats shipped to our doorsteps (Cormer 1319).

[5] Some go so far as to argue that in a world where everyone is well fed with local, fresh food, there will be more individual power, community and contact with nature (Norber-Hodge 4).

[6] To see pictures of a farmers market and a CSA, see Appendix A.

[7] From personal communication with Brian Simmons at the Winter Farmers Market in Pawtucket, RI on February 11th, 2012.

[8] From personal communication with store owner John Wood at The Green Grocer in Portsmouth, RI on March 27th , 2012.

[9] For graphs from the study see appendices U and V.

[10] From personal communication with various customers at the Winter Farmers Market in Pawtucket, RI on Feburary 11th 2012.

[11] From research conducted by me via written survey passed out to a small sample of Salve Regina University students in March of 2012.

[12] From personal communication with employees from Amos House at the Winter Farmers Market in Pawtucket, RI on February 11th, 2012.

[13] For graphs depicting the change in carbon dioxide in the atmosphere over time, see Appendices B and R.

[14] For a chart depicting the decreased opportunities for carbon emission in the local food system, see Appendix C.

[15] For a summary of the different attributes given to the local and global food systems, see Appendix D.

[16] Food patriotism is just one facet of a side of the LMF that appears to be searching for community through changing the food system. Among other things, they argue that spatial proximity would enhance social control and would therefore encourage better growing practices. Also, those in search of community approve of the LMF for its social interaction. They like the conversations that occur with farmers or the ideas of bringing their kids into nature (Hinrichs 33). While the search for community is not a flaw or benefit to the LMF, it is interesting to find their search in something much more economic and scientific.

[17] For example, no one is suggesting that we force Americans to give up coffee.

[18] This is akin to the debate on sustainability. In addition to general confusion, there are often many misconceptions about the definitions of the words organic, sustainable and local. As discussed in the body of the paper, local is a vague concept whose many definitions seem to

coalesce at a radius of 400 miles from the point consumption (Martinez iii). Sustainable development is development which meets the needs of the present without compromising the ability of future generations to meet their own needs. Agriculturally this means farming in ways that will allow infinite future generations to be able to do so ("Sustainability Topics"). Organic agriculture is agriculture which does not use synthetic chemicals or any other substances prohibited by the Organic Food Production Act (Organic 4) (For further explanation of organic food production, see Appendix J).

[19] From personal communication with John Wood

[20] Many LFM proponents would view this as a cruel mathematical trick and argue that they are not interested in the miles per item measurement. However, unless their argument is philosophical rather than scientific, this measurement has to be considered. If they problem is environmental impact due to GHG emissions, we need to know the emissions per item so that the change in impact can be predicted or measured.

[21] The American equivalent of the type of big-box system to which the study refers is a delivery service like Peapod offered by Stop and Shop.

[22] See Appendices K-O for further understanding of the different impacts that different foods and the way they are transported has on greenhouse gas emissions. Additionally, for a depiction of how restructuring our meals could produce the same effects as localization, see Appendices E&F.

[23] Some argue that canned foods and increased availability of white flour and sugar decreased health in the late nineteenth century. However, any difference in health was made up for by the new abundance of fresh food (Cormer 1316).

[24] See appendices G,H, S, T, P and Q for graphs regarding Methane and Nitrous Oxide. Additionally, see Appendices G&H for graphs depicting methane and nitrous oxide concentrations over time.

[25] In this light, the LFM becomes a movement for people who can afford to be concerned with quality. Many people simply need food and it doesn't matter how good it is. People who can afford to buy the best will, and in many cases the LFM is right, the best food is local food.

[26] Original data collected from the Winter Farmer's Market in Pawtucket, RI and from Stop and Shop in Newport, RI on April 14th, 2012. For a figure with a larger sampling see Appendix W.

[27] Additionally, the opposite problem to specialty markets exists. Not locality can produce everything needed. As stated before, it would be incredibly difficult to grow tropics specific plants in Rhode Island; therefore no one is suggesting that we localize coffee production. The places that currently grow our food do so in generally a very economical manner due to mass production. Mass producing items becomes nearly impossible food production is localized.

[28] From interview with bakery owners at the Winter Farmer's Market in Pawtucket, RI on February 11th, 2012.

[29] From interviews with customers at the Winter Farmer's Market in Pawtucket, RI on February 11th 2012.

[30] Interview with Farm Fresh RI staff at Winter Farmer's Market in Pawtucket, RI on February 11th, 2012.

[31] Personal experience in Salve Regina University's Hydroponic Lab

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